City of Sunnyvale
2006 Bicycle Plan

Prepared by Korve Engineering

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Caltrain railcar images: Caltrain
VTA railcar images: VTA
Proposed MUTCD guide signs: National Committee on Uniform Traffic Control Devices
All others: City of Sunnyvale or Korve Engineering

Caltrans Bicycle Transportation Account (BTA) Cross-Reference

The state Bicycle Transportation Account (BTA), administered by the Caltrans Bicycle Facilities Unit (BFU), funds projects that improve safety and convenience for bicycle commuters. To apply for BTA funding, Sunnyvale must have a Bicycle Transportation Plan (BTP) addressing items (a) through (k) of Streets and Highways Code Section 891.2, adopted no earlier than four years prior to July 1 of the fiscal year in which BTA funds are granted. The City must adopt the BTP or certify that it has been updated and complies with Section 891.2 and the Regional Transportation Plan (RTP), after which the Metropolitan Transportation Commission (MTC), the Bay Area's Metropolitan Planning Organization (MPO), must also certify this. The City then submits the BTP to Caltrans.

This Plan satisfies each of the 11 Bicycle Transportation Account requirements as follows:

Caltrans Bicycle Transportation Account (BTA) requirement		Plan section
a	The estimated number of existing bicycle commuters in the plan area and the estimated increase in the number of bicycle commuters resulting from implementation of the plan.	2.3
b	A map and description of existing and proposed land use and settlement patterns which shall include, but not be limited to, locations of residential neighborhoods, schools, shopping centers, public buildings, and major employment centers.	2.2
c	A map and description of existing and proposed bikeways.	2.1
d	A map and description of existing and proposed end-of-trip bicycle parking facilities. These shall include, but not be limited to, parking at schools, shopping centers, public buildings, and major employment centers.	2.5
e	A map and description of existing and proposed bicycle transport and parking facilities for connections with and use of other transportation modes. These shall include, but not be limited to, parking facilities at transit stops, rail and transit terminals, ferry docks and landings, park and ride lots, and provisions for transporting bicyclists and bicycles on transit or rail vehicles or ferry vessels.	2.4 (Transit) 2.5 (Parking)
f	A map and description of existing and proposed facilities for changing and storing clothes and equipment. These shall include, but not be limited to, locker, restroom, and shower facilities near bicycle parking facilities.	2.5
g	A description of bicycle safety and education programs conducted in the area included within the plan, efforts by the law enforcement agency having primary traffic law enforcement responsibility in the area to enforce provisions of the Vehicle Code pertaining to bicycle operation, and the resulting effect on accidents involving bicyclists.	2.6 (Safety) 2.7 (Education)
h	A description of the extent of citizen and community involvement in development of the plan, including, but not limited to, letters of support.	1.3
i	A description of how the bicycle transportation plan has been coordinated and is consistent with other local or regional transportation, air quality, or energy conservation plans, including, but not limited to, programs that provide incentives for bicycle commuting.	1.2
j	A description of the projects proposed in the plan and a listing of their priorities for implementation.	5.4 (CIP)
k	A description of past expenditures for bicycle facilities and future financial needs for projects that improve safety and convenience for bicycle commuters in the plan area.	5.5 (CIP)

1 Introduction

1.1 Overview

Environment

The City of Sunnyvale is home to 133,086 residents and is located in the heart of Silicon Valley, 40 miles south of San Francisco and five miles north of San Jose. Home to many world-class technology companies, its workforce population is approximately 72,400. The City's essentially flat terrain, moderate size, mild Bay Area climate, well-connected suburban street network, neighborhood schools and parks, bicycle-friendly transit systems, and multi-use paths and trails make it an ideal place for year-round "utility" and recreational bicycling by persons of all ages. The 175-acre Baylands Park, located in the northeast corner of the City, features developed recreational facilities, a large wetlands preserve, and segments of the San Francisco Bay Trail that connect to neighboring cities.

Recent history

In the 13 years that have passed since the Sunnyvale's most recent comprehensive Bicycle Plan (1993), the City and its environment have changed significantly. A downtown revitalization was launched several years ago, and significant office buildings have created a skyline along Mathilda Avenue. Historic Murphy Street, downtown's "restaurant row", is envisioned to be joined to a new mixed-use town center. In 1993 Caltrain commuter trains were preparing to accommodate bicycles aboard for the first time; they now provide dedicated on-board space and carry hundreds of bicyclists every day. Santa Clara County's Light Rail network now serves Sunnyvale's Tasman Drive and Moffett Park areas; its railcars have dedicated bicycle spaces. All of VTA's buses, and almost all other transit buses in the region, now have two-bike front-mounted racks.

The City has complemented these changes with steady expansion of its bikeway network. Three new bicycle-pedestrian bridges will span Sunnyvale's freeways by 2010, providing direct and comfortable connections between residences and workplaces in Moffett Park at the City's north end, and Cupertino to the south. Large and small bikeway network improvements are now coordinated by the City's Bicycle Capital Improvement Program (CIP), created in 2000. Key practices for on-street bicycle accommodation have been "institutionalized" by the City's staff.

About this Plan

This Bicycle Plan continues Sunnyvale's development of bicycling infrastructure, practices, and policies, all intended to provide a convenient transportation alternative to motor vehicles. It describes current Community Conditions relevant to utility and recreational bicycling, including existing and planned facilities of Sunnyvale and its neighboring jurisdictions. To carry Sunnyvale through its next decade, the Plan updates the Bicycle Capital Improvement Program and the Goals, Policies, and Action Statements that guide all bicycling improvements.

The goals of the City's bicycle program include continued build-out of the bikeway network to facilitate commute and recreational trips, development of additional policies and standards to support bicycling in city government and at workplaces, enhancement

of education options and their availability for both bicyclists and motorists, and continuation of effective law enforcement.

It is recommended that this Plan be reviewed and updated at least every ten years so that it continues to reflect Sunnyvale's current and planned bicycle program.

1.2 Relationship to other Studies, Plans, and Projects

Several planning documents by the City and other agencies affect Sunnyvale's physical and policy environments for bicycling. Reference information used in developing this Plan is listed in Appendix F. Some of the following plans are described in more detail in Section 2: Community Conditions.

Sunnyvale Studies, Plans and Projects

SUNNYVALE GENERAL PLAN

This Bicycle Transportation Plan is consistent with the Sunnyvale General Plan's Land Use and Transportation Element (LUTE). Several Action Statements in that Element directly address bicycling; these are listed in Table 4.1 in this Plan's Goals, Policies and Action Statements section. This Plan is also consistent with the Energy Element and Air Quality Sub-Element of the General Plan, which have been determined by the City Council to be consistent with the Bay Area Clean Air Plan.

SUNNYVALE MUNICIPAL CODE

Sunnyvale's Municipal Code addresses bicycling in two sections: Title 10 (Vehicles and Traffic) and Title 19 (Zoning). Appendix B summarizes their bicycle-related provisions.

MOFFETT PARK SPECIFIC PLAN

The Moffett Park Specific Plan, completed in 2002, guides development of Sunnyvale's major office/industrial area north of Highway 237. It creates a zoning category to provide incentives for higher-density walkable development near the area's Light Rail stations, and includes bicycle parking standards. This plan is described in more detail in Section 2.2.

DOWNTOWN SPECIFIC PLAN

The 2003 Downtown Specific Plan guides future development of the mostly commercial area bounded by Mathilda Avenue, the Caltrain line, Sunnyvale Avenue, and El Camino. It benefits bicycling by encouraging the re-connection of several streets through the downtown core, and by creating opportunities for more destinations within easy bicycle distance of Sunnyvale residences. The plan recommends bicycle lanes on Iowa, Evelyn, and Sunnyvale Avenues, and these have been implemented on the latter two streets. Its Policy C.7 states "Follow the VTA standards for bicycle parking to the extent possible."

FUTURES STUDY

This 1993 study examined the possibility of rezoning certain industrial and office sites to allow development of multifamily housing ("Industrial-To-Residential", or ITR) or higher-density commercial/industrial use. Several of these sites are being built out, and the increased density combined with proximity to other Sunnyvale destinations is expected to generate new bicycle trips.

TASMAN / FAIR OAKS PEDESTRIAN AND BICYCLE PLAN

One ITR site is located at the intersection of Tasman Drive and Fair Oaks Avenue. Its new medium- and high-density housing will add bicycle trips to work and nearby schools. The adjacent Fair Oaks Light Rail station will support bike-on-transit trips.

MATHILDA AVENUE BRIDGE REHABILITATION PROJECT

The City plans to reconstruct the Mathilda Avenue bridge over the Caltrain line between California Avenue and Washington Avenue. The project will include replacement of the existing southbound exit ramp to westbound Evelyn Avenue with a loop ramp that terminates at a new signal that will allows turns onto both directions of Evelyn.

The existing bridge and its southbound exit ramp to westbound Evelyn Avenue have neither bike lanes nor striped shoulders. The widened bridge is planned to have five-foot shoulders and the new exit ramp will have an eight-foot shoulder. Charles Street's intersection with Evelyn will be replaced with a street closure that preserves through bicycle travel to and from Evelyn.

Studies, Plans and Projects and by other agencies

2000 VTA COUNTYWIDE BICYCLE PLAN

The Santa Clara Valley Transportation Authority (VTA) published a countywide bicycle plan in 2000. It describes a network of 16 cross-county routes, seven of which traverse Sunnyvale as described in Table 1.1. Projects on these corridors receive extra points in VTA's ranking system for funding that it administers. As of 2006, an update of the Countywide plan was in progress; it may expand the cross-county route network.

2001 MTC BAY AREA REGIONAL BICYCLE PLAN

The Metropolitan Transportation Commission (MTC), the 9-county Bay Area's Metropolitan Planning Organization (MPO), published a Regional Bicycle Plan in 2001. This Plan identified a Regional Bikeway Network with several segments within and through Sunnyvale. Regional route segments are also summarized in Table 1.1.

Table 1.1: Countywide and Regional Bicycle Routes in Sunnyvale

Street	From	To	VTA Cross-County	MTC Regional	Completed
Arques	Wolfe	E City Limit (Scott Blvd)	1	x	Yes
Bay Trail	W City Limit	E City Limit	11	x	Yes
Borregas	Maude	Bay Trail	14	x	Yes
Crossman	Moffett Park Drive	Fair Oaks	8		Yes
Elko	Lawrence	Reamwood	8		Yes
Evelyn	Sunnyvale	E End (Reed)	13		Yes
Fair Oaks	Crossman	Fair Oaks Way	8		No
Fair Oaks Way	Fair Oaks	Persian	8		No
Homestead	W City Limit (Foothill Expwy)	E City Limit	2	x	Yes
Mary	Homestead	Moffett Park Drive	3		No
Maude	W City Limit (to Middlefield)	Wolfe (end)	1, 14	x	Partially
Moffett Park Drive	W City Limit (Manila)	Caribbean (Hwy 237 path)	8	x	Partially
Persian	Fair Oaks Way	Lawrence	8		Yes
Reamwood	Elko	Tasman	8		Yes
Reed	Evelyn	E City Limit (Monroe)	13		Yes
Saratoga-Sunnyvale	Homestead	Sunnyvale		x	Yes
Sunnyvale	Saratoga-Sunnyvale	Maude		x	Partially
Sunnyvale	Washington	Evelyn	13		Yes
Tasman	Reamwood	E City Limit	8		No
Washington	W City Limit (Dana St)	Sunnyvale	13		No
Wolfe	Fair Oaks (N end)	S City Limit	14		Yes
Wolfe	Maude	Arques	1	x	Yes

SAN FRANCISCO BAY TRAIL

The Bay Trail Project is a nonprofit organization administered by the Association of Bay Area Governments (ABAG) that coordinates the implementation of the Bay Trail. When complete, the Bay Trail will be a continuous 500-mile network that will encircle San Francisco and San Pablo Bays. The Bay Trail is enjoyed by walkers and recreational cyclists. Some segments also attract bicycle commuters, depending on total trip distance.

To date over half of the Bay Trail's proposed length has been developed, including its entire length within the city limits as shown in Figure 1.1 and described in Table 1.2. These segments appear in green on the City's Bike Map. Figure 1.1 also shows existing and future connecting trails in purple: Stevens Creek Trail in Mountain View, San Tomas Aquino Creek Trail in Santa Clara, and the Guadalupe River Trail in San Jose. The yellow arrow illustrates a future Bay Trail connection opportunity, described below.

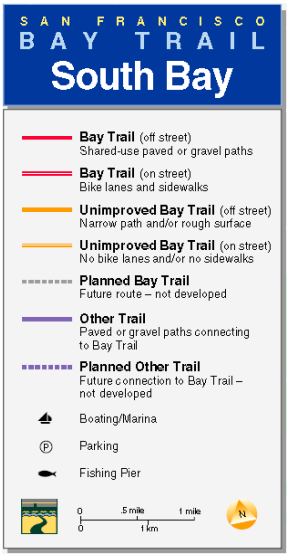


Figure 1.1: Bay Trail South Bay map – Moffett Field, Sunnyvale, and Alviso areas

Table 1.2: Existing Sunnyvale Bay Trail segments

Type	Location	Paved	Notes
Trunk	Mathilda Avenue to Calabazas Creek	No	Link via Mathilda sidewalk to Bordeaux Dr. signal, and to Borregas Ave. via Carl Rd. (Smart Station recycling plant access road)
Loop	Ponds between Mathilda and Borregas	No	Access to Bay Trail trunk near Carl Rd.
Spur	Along the Sunnyvale Baylands Park frontage road from Caribbean Drive to Calabazas Creek	Yes	Connects to Bay Trail in Santa Clara, and San Tomas Aquino Creek under Hwy 237

Sunnyvale's Legislative Policy considers the federal lands currently occupied by Moffett Federal Airfield to be within the City's sphere of influence. Policy B.2 of the Sunnyvale General Plan's Open Space Sub-Element states "Pursue the acquisition of federal lands currently located at Moffett Naval Air Station".

Bay Trail Project planning documents describe a gap across Moffett Field between Mountain View's Shoreline Park / Stevens Creek Trail terminus, and Sunnyvale's Bay Trail segments. As shown by the dotted gray line in Figure 1.1, this gap spans the north edge of Moffett Field, which occupies federal lands between Sunnyvale and Mountain View. Closing this gap would connect Sunnyvale to Mountain View and Palo Alto's trails, enabling Bay-side commutes to Sunnyvale's Moffett Park workplaces and expanding recreational options. ABAG's 2005 Gap Analysis Report estimated the distance at 2.7 miles and the cost at $4.1 million. Bay Trail staff noted that this preferred alignment has significant implementation issues including security of the runway and nearby munitions storage, and contamination.

NASA Ames Research Center Development Plan

The Moffett Field complex includes NASA's Ames Research Center, which is in the process of preparing for redevelopment. The Ames Development Plan Final Programmatic Environmental Impact Statement (EIS), dated July 2002, states:

> "Development cleared under the CANG and CUP EAs [California Air National Guard and Comprehensive Use Plan Environmental Assessments] will consist of the following elements:"
> ….
> - The granting of an easement for a future segment of the Bay Trail along Ames Research Center's northeastern border. In order for this easement to be safe for public use, the ordnance in the affected munitions bunkers would be relocated to existing bunkers within the golf course in the Eastside/Airfield area."

NASA and ABAG have signed a Memorandum of Understanding (MOU) for Bay Trail planning.

South Bay Salt Ponds Restoration Project

The South Bay Salt Ponds Restoration Project is designing and managing the transformation of hundreds of acres of ponds in the southern half of San Francisco Bay from salt production to wildlife habitat. This project proposed to close the above-described Bay Trail gap across Moffett Field via an alternate alignment on pond levees designed by this project. Its Phase 1 Final Alternatives Report details two pond

management schemes, Alternatives B and C, both of which enable this connection as described in Section 6.2.3 (Public Access, Alternative B):

> *A year-round trail [would extend] east from the Stevens Creek Trail, along a proposed flood control levee connecting it to proposed and existing trails around the Sunnyvale Treatment Ponds…*

This connection is shown in yellow-red in Figure 1.2, copied from that report. The route would traverse Pond A2E and the south edge of Pond A3W. The U.S. Fish and Wildlife Service anticipates opening the trail in mid-2008.

The long-term alignment would use a new flood control levee (solid orange line) to be constructed later. The intended levee currently has a soft surface and is inaccessible during the rainy season. A stabilized gravel surface would better accommodate year-round bicycle use, though a paved trail would be optimal for both commuting and recreation.

The alignment options for the Bay Trail in the Moffett Field area are largely dictated by the presence and suitability of pond levees and maintenance roadways, tempered by the need for adequate clearance around the end of the runway and stored ordinance. In contrast, it seems likely that the choice of Trail surface is something that input from agencies such as the City of Sunnyvale can affect.

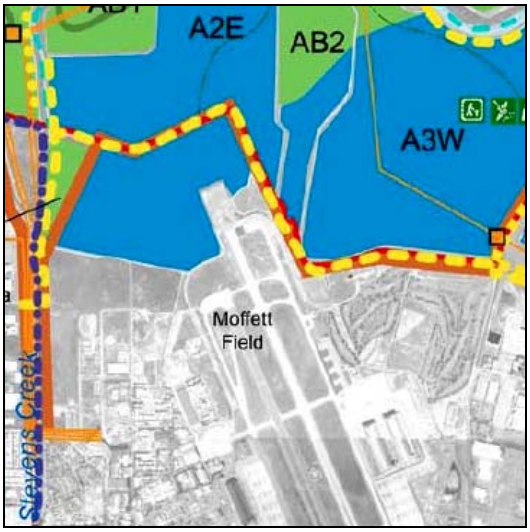


Figure 1.2: Salt Ponds Restoration Project Moffett Field trail segment
Phase 1 Action map – Alviso Alt B, 10/21/2005

Connections east of Sunnyvale Baylands Park

The current Bay Trail alignment east of Calabazas Creek, the Sunnyvale city limit, follows the Gold Street Connector – a frontage road along the north side of Highway 237 – to the Lafayette Street / Gold Street interchange. Midway along this frontage road the Trail connects to the City of Santa Clara's San Tomas Aquino Creek Trail at its undercrossing of Highway 237. The San Tomas Aquino Creek Trail continues south, crossing under US-101 to its current terminus at Scott Boulevard.

The City of San Jose plans to extend the Guadalupe River Trail, whose north terminus is currently at I-880, all the way to the Bay with a final terminus at Gold Street near Alviso Marina. Completion of the Guadalupe River Trail will create an opportunity for a Bay-side alignment of the Bay Trail trunk between Sunnyvale Baylands Park and Alviso along levees running east from the Twin Creeks softball complex. This potential link is shown by the yellow arrow in Figure 1.1.

CITY OF MOUNTAIN VIEW

On-Street Bikeways

Mountain View's 2003 Bicycle Transportation Plan shows six existing or planned bikeways connecting to Sunnyvale or near the Sunnyvale city limit:

Table 1.3: City of Mountain View bikeways near or connecting to Sunnyvale

Bikeways (north to south)	Type	Sunnyvale connection
Manila Drive (east of Ellis Street and the Bayshore Light Rail Station)	Bike Lanes	Manila continues east, with bike lanes, as a County road that connects to H Street and Moffett Park Drive in Sunnyvale.
E. Middlefield Road	Bike Lanes	Middlefield Road ends at Central Expressway, a County facility that has striped shoulders
E. Dana Street	Bike Route	Becomes Washington Avenue, which continues through downtown Sunnyvale. Washington is an unsigned "Beginner"-rated route on Sunnyvale's bike map. There is a street closure at the city limit but bicycles can proceed past the barrier along the curb.
Dale Avenue / Heatherstone Way	Signed Bike Route	Heatherstone continues into Sunnyvale across Knickerbocker Drive, a Sunnyvale street with bike lanes.
Stevens Creek Trail	Path (existing, planned)	Currently ends just north of El Camino Real. Planned extension will connect to Heatherstone Way, which connects to Knickerbocker Drive in Sunnyvale.
Bryant Avenue	Bike Lanes	None currently; bike lanes end at Mountain View High School. See Stevens Creek Trail discussion for possible future connection to Sunnyvale via Remington Drive.

The City of Mountain View indicated that it has no current plans to expand its on-street bikeway network near Sunnyvale.

Stevens Creek Trail

The Stevens Creek Trail follows Stevens Creek within and adjacent to the Highway 85 (Stevens Creek Freeway) right of way. Since the early 1990s, Mountain View has been constructing the Trail southward from San Francisco Bay, and the Trail now extends almost to El Camino Real, with its southernmost access point at Yuba Drive on the west side of the creek.

The City of Mountain View plans to extend the Stevens Creek Trail south of El Camino Real. The next phase ("Reach 4") is planned to extend to Sleeper Avenue and to bridge the Creek to the corner of Dale Avenue and Heatherstone Way, both of which are Bike Routes (Class III bikeways). That corner is one block from Knickerbocker Drive in Sunnyvale, so the creek bridge would provide Sunnyvale residents with access to the Trail.

Figure 1.3: Dale Ave. / Heatherstone Way area
Blue dots = Planned Stevens Creek Trail
Solid yellow and green = bike lanes
Dashed green = bicycle routes

This phase is being funded and implemented in three pieces as described in Table 1.4.

Table 1.4: Stevens Creek Trail – next phase ("Reach 4") implementation status

#	From (north or west endpoint)	To (south or east endpoint)	Status
1	Yuba Drive	Just south of El Camino Real, via new undercrossing of that roadway	Design completion expected June 2006. Construction completion expected Summer 2007
2	Just south of El Camino Real	Sleeper Avenue	Unfunded
3	Sleeper Avenue	Dale Avenue, via new overcrossing of Stevens Creek. This overcrossing would create access to Sunnyvale streets via Heatherstone Way.	Unfunded

When Reach 4 is completed, Mountain View will consider extending the Trail to Mountain View High School, its southern limit within that City, as depicted in Mountain View's 2003 Bicycle Transportation Plan. That segment will probably use a thin sliver of Mountain View land east of the freeway to near Bryant Avenue, then bridge back over to the High School. The "high school" bridge would be close to the intersection of Remington Drive and Robin Way in Sunnyvale.

Trail development south of the Mountain View High School area would be handled by the City of Sunnyvale, possibly in cooperation with the Town of Los Altos (the Creek runs on the west side of Highway 85 south of Townsend Terrace). A 1994 feasibility study by Sunnyvale's Parks and Recreation Department, titled "Evaluation of Policy and Planning Issues Related to Proposed Stevens Creek Trail Impacting Sunnyvale" considered both creek-side and on-street Trail alignments. This item went before the City Council on November 29, 1994. Current City policy is to consider on-street Trail alignments.

CITY OF SANTA CLARA

Santa Clara's 2004 Bicycle Map shows six existing or planned bikeways connecting to Sunnyvale or near the Sunnyvale city limit:

Table 1.5: City of Santa Clara bikeways near or connecting to Sunnyvale

Bikeways (north to south)	Type	Sunnyvale connection
Path from Gold Street along north side of Highway 237	Path	Path continues through Sunnyvale Baylands Park to Caribbean Drive
Calabazas Creek east levee	Path	Sunnyvale has a path on the west levee of Calabazas Creek. A bridge connects the two paths just south of the John W. Christian Greenbelt.
Mission College Boulevard	Unsigned route	Wildwood Avenue currently has no bicycle facility but is in the Bicycle Capital Improvement Plan
Lakeside Drive	Bike Lanes	Bike lanes continue for the full length of Lakeside in Sunnyvale
Scott Boulevard	Bike Lanes	Bike lanes continue on Arques Avenue in Sunnyvale
Central Expressway	Shoulder stripe	Striped shoulders continue through Sunnyvale
Kifer Road	Unsigned route	Kifer Road in Sunnyvale has bike lanes west of Lawrence Expressway
Lawrence Expressway	Shoulder stripe	Shoulder stripes continue along Sunnyvale edge
Poinciana Drive	Bike Lanes	Poinciana ends at Tamarack Lane, which is in the Bicycle Capital Improvement Program
El Camino Real	Unsigned route	El Camino Real is in the Bicycle Capital Improvement Program
Dunford Way	Unsigned route	Dunford Way is in the Bicycle Capital Improvement Program
Homestead Road	Unsigned route	Homestead Road has bike lanes in Sunnyvale

The routes shown on Santa Clara's most recent Bicycle Map represent all existing and planned bikeways adjacent to Sunnyvale.

Santa Clara traffic engineering staff communicates frequently with Sunnyvale staff on transportation issues involving both cities.

CITY OF CUPERTINO

On-Street Bikeways

Cupertino's current Bicycle Map shows five bikeways connecting to Sunnyvale.

Table 1.6: City of Cupertino bikeways near or connecting to Sunnyvale

Bikeways (west to east)	Type	Sunnyvale connection
Stelling Road	Bike Lanes	Terminates at Homestead Road, which has bike lanes
N. DeAnza Boulevard	Bike Lanes	Becomes Sunnyvale-Saratoga Road, which has bike lanes
Blaney Avenue	Bike Lanes	Terminates at Homestead Road, which has bike lanes
Wolfe Road	Bike Lanes	Bike lanes continue into Sunnyvale
Tantau Avenue	Bike Lanes	Intersects with Homestead Road, which has bike lanes, and becomes Quail Avenue, which is in the Bicycle Capital Improvement Plan

Staff of Cupertino's Public Works Department stated that the routes shown on Cupertino's most recent Bicycle Map represent all existing and planned bikeways adjacent to Sunnyvale except for the planned Mary Avenue / I-280 pedestrian-bicycle bridge described elsewhere in this document.

Mary Avenue / I-280 Overcrossing

As described elsewhere in this Plan, the Mary Avenue overcrossing of I-280 will connect Mary Avenue in Sunnyvale to Mary Avenue in Cupertino via path segments north and south of the overcrossing.

CITY OF LOS ALTOS

On-Street Bikeways

The City of Los Altos has two bikeways that connect to Sunnyvale:

Table 1.7: City of Los Altos bikeways near or connecting to Sunnyvale

Bikeways (west to east)	Type	Sunnyvale connection
Fremont Avenue	Bike Lanes	Bike lanes continue for the full length of Fremont Avenue in Sunnyvale
Homestead Road	Bike Lanes	Bike lanes continue for the full length of Homestead Road in Sunnyvale

No additional on-street bikeways are planned near the city limit.

Stevens Creek Trail

The City of Los Altos plans to study options for the Stevens Creek Trail within its boundaries.

1.3 Summary of Citizen Involvement in Bicycle Planning

Public involvement in the review and approval of various City actions that comprise elements of this Plan are as follows:

Table 1.8: Citizen and Community Involvement

Document or Program	**Citizen and Community Involvement** (BPAC = Bicycle Pedestrian Advisory Committee)
2006 Bicycle Transportation Plan (this document)	BPAC public hearing for approval of work scope Four BPAC review meetings One public workshop One BPAC public hearing One City Council public hearing Posting of the draft document on the City website; Distribution of copies of the draft document to agencies
2000 Long-Range Bicycle Capital Improvement Study	Hearings at five Bicycle and Pedestrian Advisory Committee meetings. City Council approval.
1998 Bicycle Opportunities Study	Hearings at four Bicycle Advisory Committee meetings. City Council approval.
Development of bicycle support facility incentives and requirements for bicycle parking at multi-family residential developments	Two hearings by the Sunnyvale Bicycle Advisory Committee; One Planning Commission public hearing; Two Sunnyvale City Council public hearings.
1997 Land Use and Transportation Element of the General Plan	Six joint Planning Commission / City Council study sessions; Formation of a 25-member citizen focus group representing a broad range of community interests, and three meetings of this group; One day-long community workshop; Distribution of 110 copies of the draft to concerned citizens and agencies; Notifications of City Council public hearing to 50 additional concerned citizens; Presentations to the Sunnyvale Bicycle Advisory Committee and the Housing and Human Services Commission; One Planning Commission public hearing; One City Council public hearing; Announcement of City Council public hearing in the San Jose Mercury News
1993 Bicycle Plan	Five public hearings before the Sunnyvale Bicycle Advisory Committee Distribution of approximately 150 copies of the draft document Notification to nine bicycling organizations Notification of City Council hearing in the Sunnyvale Sun (city newspaper) Public hearing before Sunnyvale City Council
Proposed or completed bicycle projects	Considered by the City Council and/or subject to public hearings when grant applications are authorized or when the annual city budget is approved. City budget adoption involves two public hearings. Individual projects typically also involve community meetings and BPAC public hearings during the project design process.

2 Community Conditions

2.1 Bikeway Network

This section describes Sunnyvale's existing bikeway network. This network consists of on-street bicycle lanes, shared roadways, and shared-use paths and trails.

A *bicycle lane, or "bike lane",* is a striped lane on the street, reserved for bicycle travel except for right turn areas at intersections, and for vehicle parking when it is combined with the bike lane. Bike lanes are one-way facilities in which bicyclists travel in the same direction as motor traffic on their side of the street.

(a) Bicycle Lane

(b) Shared Roadway

(c) Shared-Use Path

(d) Trail (unpaved)

Figure 2.1: Types of bikeways

A *shared roadway* is a street segment without a striped lane exclusively for bicycle travel, with wide outside through lanes or sufficient total unstriped width that bicyclists can be comfortably passed by faster traffic. Most residential streets are shared roadways.

A *signed shared roadway*, commonly known as a "bike route", is identified by signing as a preferred alignment for any of several reasons listed in the AASHTO Guide for the Development of Bicycle Facilities:

a. The route provides continuity to other bicycle facilities such as bike lanes or shared use paths.
b. The road is a common route for bicyclists through a high demand corridor.
c. In rural areas, the route is preferred for bicycling due to low motor vehicle traffic volume or paved shoulder availability.
d. The route extends along local neighborhood streets and collectors that lead to an internal neighborhood destination such as a park, school, or commercial district.

Some of Sunnyvale's shared roadways are signed; others are indicated only by highlighting on the City's bicycle map.

Shared-use paths and *trails* are two-way off-street facilities for use by nonmotorized traffic including bicyclists, walkers, and skaters. Shared-use paths are paved; trails are unpaved and may not be usable on a bicycle during the rainy season.

Bicyclists have the same origins and destinations as motorists but generally travel at lower speeds, so they value direct and well-connected routes with minimal delays. Sunnyvale's bikeway network segments are primarily on arterial and collectors because those streets maximize directness, minimize stops, and serve the city's primary destinations and workplaces.

Planned improvements are described in detail in Section 5: Bicycle Capital Improvement Program (CIP). Improvements planned in jurisdictions adjacent to Sunnyvale are described in Section 1.2: Relationship to Other Plans and Studies.

Roadway network

The City's roadway network was largely constructed in the 1950s and 1960s. It forms a one-mile grid of multi-lane arterials, traversed by US-101 (the Bayshore Freeway) and Highway 237 at its north end and bordered by Highway 85, I-280, and Lawrence Expressway to the west, south, and east. North-south arterials include Mary Avenue, Mathilda Avenue, Sunnyvale-Saratoga Road, Fair Oaks Avenue, and Wolfe Road. East-west arterials include Caribbean Drive, Tasman Drive, Arques Avenue, Central Expressway, Kifer Road, El Camino Real (State Route 82), Fremont Avenue, and Homestead Road. Although many of these arterials have bicycle lanes, they can also be obstacles to bicyclists in the cross-direction where signalized cross-streets are infrequent. The Caltrain railroad right-of-way runs east-west through the center of Sunnyvale and is another significant barrier to north-south travel.

Bicyclists also benefit from the half-mile secondary grid of collector streets: Bernardo Avenue, Pastoria / Hollenbeck Avenue, Borregas Avenue, Sunnyvale Avenue, and Morse Avenue in the north-south direction, Java Drive, Duane Avenue, Maude Avenue, California Avenue, Evelyn Avenue, Remington Drive, and The Dalles Avenue / Alberta Avenue / Inverness Way in the east-west direction.

The City has 79 miles of bike lanes, an increase from 31 miles in 1993.

Paths

In addition to the roadway network, bicyclists use several paved paths throughout the City. These include the John W. Christian Greenbelt on the Hetch Hetchy Aqueduct right of way north of US-101, the Calabazas Creek Trail between US-101 and Old Mountain View-Alviso Road, and the Bay Trail segment north of Highway 237 in Baylands Park. Several short path segments throughout the City connect streets to schools and to other streets.

Existing and funded bikeway network

Figure 2.2 shows Sunnyvale's existing and funded bike lanes, routes, and paths. The City's 2005 Bicycle Map appears as Figure 2.17.

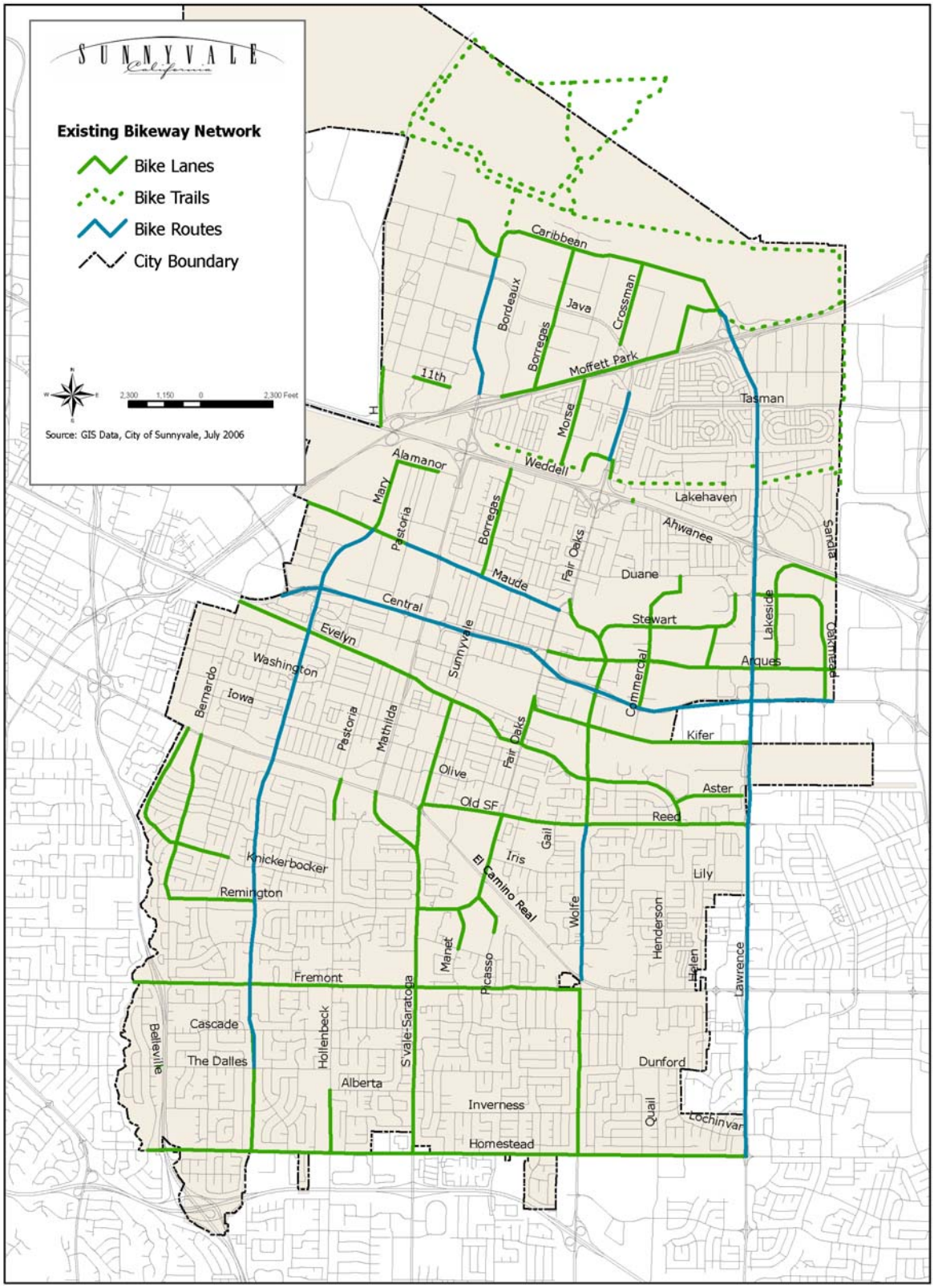


Figure 2.2: Existing bikeway network

2.2 Land Use Plans and Guidelines

OVERVIEW

Figure 2.3 shows land use designations from Sunnyvale's 1997 General Plan. The legend is enlarged at right:

Although Sunnyvale is mostly built out and envisions no changes to its single-family residential areas, land uses are changing significantly in several areas described in the following subsections:

The 2001 Moffett Park Specific Plan will guide development of the non-residential area north of Highway 237, encouraging higher densities near Light Rail stations, and providing pedestrian connectivity that is currently missing.

The 1993 Futures Study examined potential rezoning of industrial and office sites to further the City's objectives for improved jobs/housing balance, reduced transportation congestion, and improved air quality. It identified six industrial sites for rezoning to "Industrial to Residential" (ITR), allowing medium- and high-density "infill" housing, and four sites for "industrial intensification" through increased floor area ratio.

The Tasman / Fair Oaks Area Pedestrian and Bicycle Circulation Plan describes nonmotorized access for Futures Housing Sites 7 and 8, two adjoining ITR zones along Fair Oaks Avenue between US-101 and Highway 237.

The Downtown Specific Plan is a long-range plan to guide development within the area roughly bounded by Mathilda Avenue, Evelyn Avenue, Sunnyvale Avenue, and El Camino Real, including the redevelopment of the downtown into a mixed-use grid-based urban core with several new parking structures.

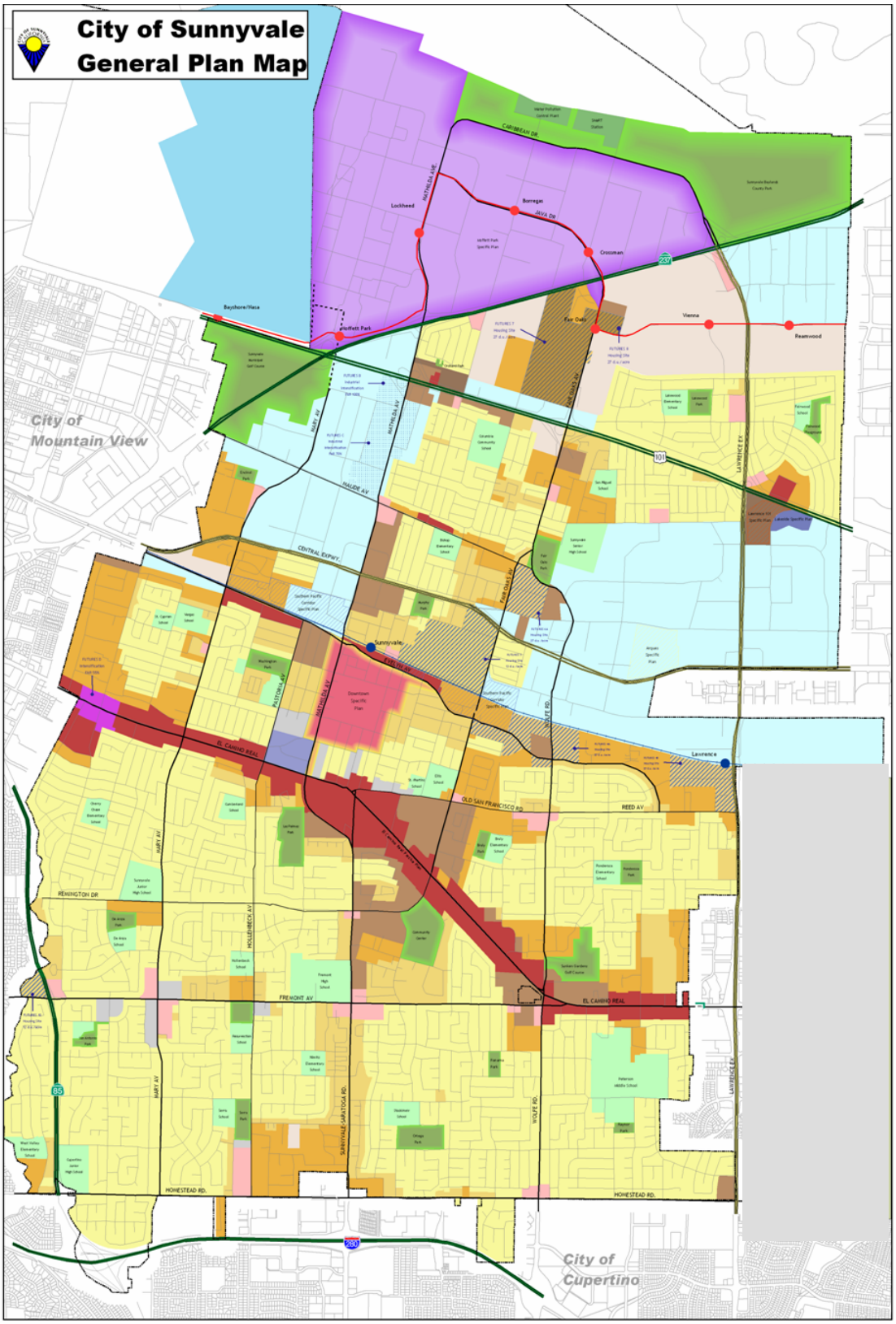


Figure 2.3: 1997 General Plan map

Moffett Park Specific Plan

Moffett Park is Sunnyvale's flagship office, research, and light industrial complex located north of Highway 237 east of US-101, and north of US-101 west of Highway 237. It intentionally excludes residential uses that might conflict with industrial processes and noise.

The Moffett Park Specific Plan, completed in 2002, is a comprehensive long-term plan intended to attract and retain high-value companies through high-quality development. Its MP-TOD zoning sub-district type encourages high-density development near Moffett Park's Light Rail stations. The Plan has several Objectives that support bicycling:

Table 2.1: Moffett Park Specific Plan Objectives Relevant to Bicycling

Category	Objective	Content
Circulation and Transportation	CIR-1	Strive for a net Transportation Demand Management trip reduction of 20% on all new development within the Specific Plan area. Encourage peak hour trip reduction options when feasible.
	CIR-2	Provide for improved pedestrian and bicyclist mobility within the Specific Plan area
	CIR-5	Require a correlation between higher intensity land uses in the Specific Plan project area and direct access to alternative modes of transportation.
General Environmental	ENV-1	Require that all potential environmental effects of new development be mitigated to the greatest extent feasible.
	ENV-4	Encourage future development to incorporate green building techniques into site design, building construction, and occupancy and operation of the building. *("LEED" [Leadership in Energy and Environmental Design] certification includes Alternative Transportation incentives for providing secure bicycle storage and changing facilities)*

The Plan requires bicycle parking at the ratios shown in Table 2.2:

Table 2.2: Moffett Park Specific Plan Bicycle Parking Requirements
(Data from Moffett Park Specific Plan Table 5.2)

Land Use Type	Required Spaces
Office Uses	1 space / 6000 SF (75% Class I, 25% Class II)
Industrial Uses	Class I / 30 employees or 1500 SF
Hotels / Motels	Class I / 30 rooms + Class I / 30 employees
Commercial	Class I / 30 employees + Class II / 6000 SF

Class I: Facilities that protect the entire bicycle from theft, vandalism and inclement weather. Appropriate for long-term (two or more hours). Examples include bike lockers, rooms with key access, guarded parking areas, and valet/check-in parking.

Class II: A bicycle rack to which the frame and at least one wheel can be secured with a user-provided U-lock or padlock and cable.

Moffett Park Specific Plan roadway improvements include the Mary Avenue Extension and a grade separation on Lawrence Expressway. The Mary Avenue Extension would span the US-101 / Highway 237 interchange. The City plans to provide bike lanes on

the Mary Avenue extension over US-101 and Highway 237, which will provide a much-needed alternative to Mathilda Avenue for cyclists who do not wish to detour to Ellis Street to cross US-101. In addition to substantially increasing motor vehicle volumes on Mary Avenue especially north of Central Expressway, this connection would also increase the use of existing bike lanes and bicycle routes further south on Mary Avenue. This project is in the conceptual design and environmental clearance phases, and may be constructed 7 to 15 years in the future.

The planned Borregas Avenue overcrossings of US-101 and Highway 237 will create a central bicycle access to Moffett Park that connects directly to downtown and its Caltrain station via Sunnyvale Avenue, and with the Borregas Light Rail station to the north.

The Plan's Exhibit 4-6 (Bikeway Improvements), shown below as Figure 2.4, shows planned bike lanes on Moffett Park Drive that have since been implemented. It does not show the Mary Avenue Extension or a future bike route on Borregas (other than the Borregas / Highway 237 overcrossing). This Exhibit does show two Santa Clara Valley Water District canal trails that may provide alternative off-street access to some parcels. These trails may significantly improve directness for pedestrian travel and will have recreational benefits. They may not attract significant numbers of commuter cyclists off nearby parallel streets because those streets have low motor vehicle volumes and provide acceptable "last block" connectivity to Moffett Park workplaces.

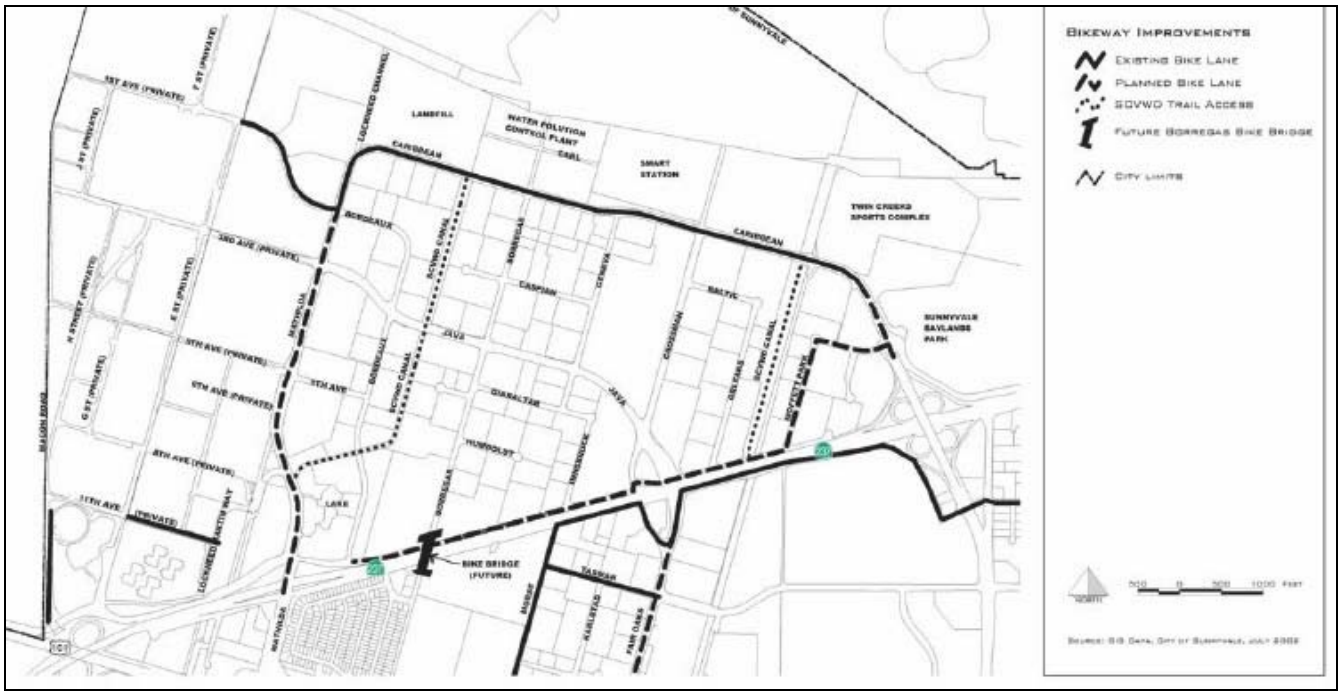


Figure 2.4: Moffett Park Specific Plan Exhibit 4-6 (Bikeway Improvements)

1993 Futures Study, 2000 Futures Sites summary

In 1993, the City completed a Futures Study that examined potential rezoning of industrial and office sites to further the City's objectives for improved jobs/housing balance, reduced transportation congestion, and improved air quality. The Futures Sites summary, published in November 2000, describes several sites identified in the 1993 study.

HOUSING SITES

Several industrial areas were rezoned as Industrial to Residential (ITR) Combining District, targeted for medium- and high-density housing:

- Site 4a: Evelyn Avenue between Fair Oaks Avenue and just east of Wolfe Road
- Site 4b: Aster Avenue between Evelyn Avenue and Lawrence Expressway
- Site 6a: Area bounded by E. Arques Avenue, Fair Oaks Avenue, Wolfe Road, and Britton Avenue
- Site 7: Area bounded by Morse Avenue, Persian Drive, Fair Oaks Way, Fair Oaks Avenue, and the John W. Christian Greenbelt
  (addressed by 2004 Tasman / Fair Oaks Area Pedestrian and Bicycle Circulation Plan)
- Site 8: North side of Tasman Drive between Fair Oaks Avenue and East Channel
  (addressed by 2004 Tasman / Fair Oaks Area Pedestrian and Bicycle Circulation Plan)

INDUSTRIAL INTENSIFICATION SITES:

Four sites were selected for intensified development of industrial, office or commercial uses by allowing increased Floor Area Ratios (FAR):

- Site B: Flanking Mathilda Avenue just south of US-101 between Vaqueros Avenue and San Aleso Avenue
- Site C: Area between Site B and Maude Avenue, between Vaqueros Avenue and Mathilda Avenue
- Site D: Area flanking El Camino Real from just west of Knickerbocker Drive to the alignment of Carnero Avenue
- Site E: Java Drive between Mathilda Avenue and Highway 237
  (Addressed by Moffett Park Specific Plan)

When developed, these sites will add bicycle trips and add or change bicycle trip types from their vicinity, such as school commutes and family recreation. For example, Housing Sites 7 and 8, described in the Tasman / Fair Oaks Area Bicycle / Pedestrian Circulation Plan (next section), will add school commute trips to Lakewood Elementary and Columbia Middle School. Industrial Intensification sites will increase demand for bicycle routes suitable for adult commuters.

Tasman / Fair Oaks Area Bicycle / Pedestrian Circulation Plan

The area bounded by the John W. Christian Greenbelt alignment, Morse Avenue, Persian Drive, and the East Channel (a channelized creek parallel to and east of Fair Oaks Avenue) contains the City's "Futures Areas" 7 and 8, designated "Industrial To Residential" (ITR). Low-rise light industrial uses within this area are being replaced by Medium-Density Residential (up to 24 Dwelling Units/acre) and High-Density Residential (up to 36 DU/acre), served by the Tasman Light Rail line along Tasman Drive to the east and along Fair Oaks Avenue across Highway 237 to the north.

Morse Avenue, Persian Drive, Fair Oaks Avenue, Weddell Drive and Tasman Drive are on Sunnyvale's bicycle route network, and the JWC Greenbelt and Weddell Drive connect the ITR area to the existing Fair Oaks (Ahwanee to Lakehaven) overcrossing and the future Borregas overcrossings. Bicycle access to and through the area is ensured through the City's development review and approval process, which includes application of VTA's Bicycle Technical Guidelines.

The Tasman / Fair Oaks Area Pedestrian and Bicycle Circulation Plan specifies circulation improvements for this area based on existing City policies. It calls for:

- Bikeways on all collector and arterial streets
- Bike racks at retail uses
- Bike parking in residential development
- Pedestrian access improvements to the Fair Oaks Light Rail station
- Reduced curb radius
- Enhanced intersections
- Pedestrian paths to shorten blocks

This Plan identifies pedestrian access improvements including the addition of a sidewalk to Weddell Drive between the JWC Greenbelt access points on either side of Fair Oaks Avenue, a segment that already has bike lanes.

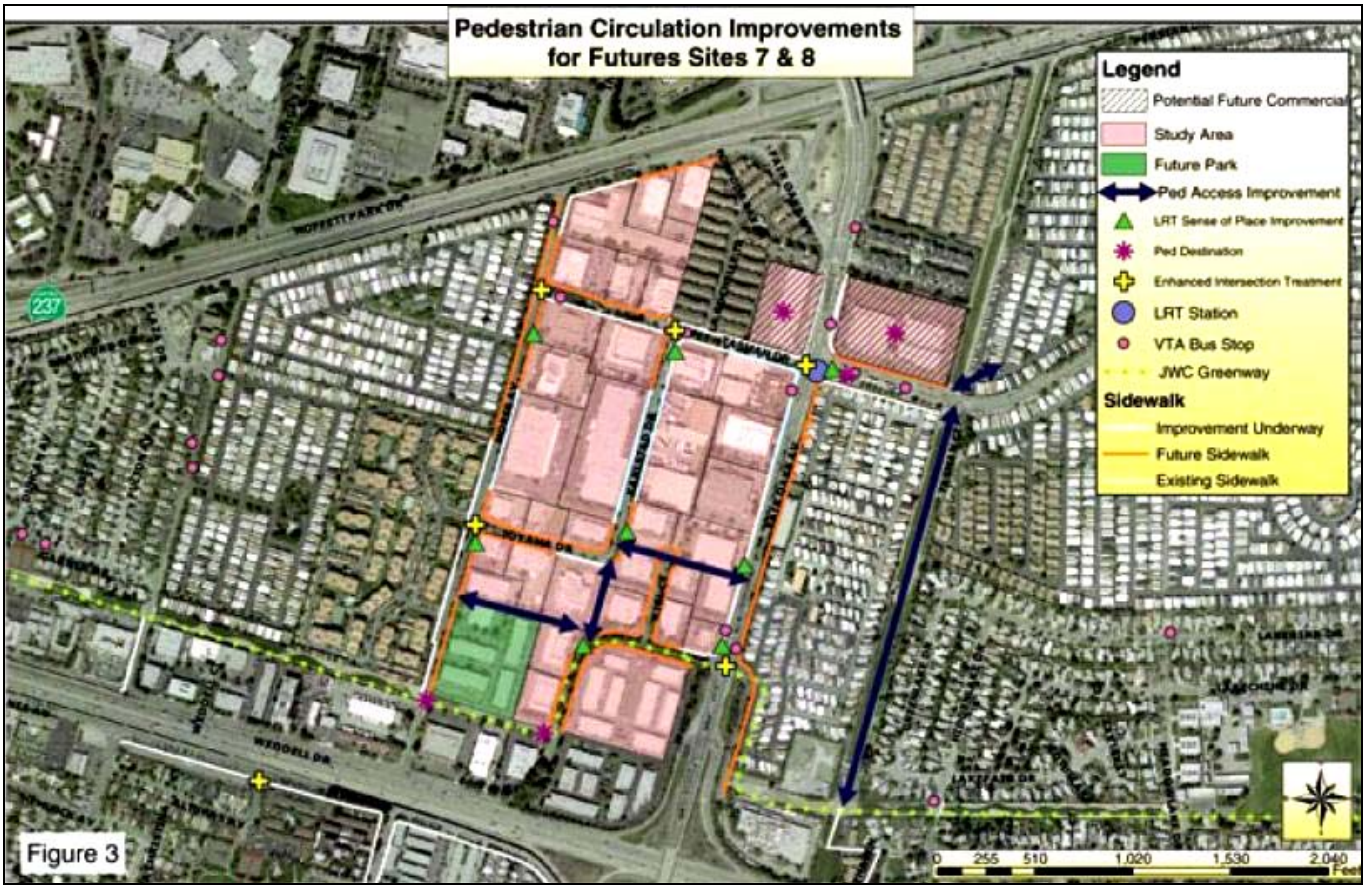


Figure 2.5: Tasman / Fair Oaks area pedestrian circulation improvements
(Tasman / Fair Oaks Area Pedestrian and Bicycle Circulation Plan, Figure 3)

2003 Downtown Specific Plan

The 2003 Downtown Specific Plan guides improvements within an area of approximately 125 acres as shown in Figure 2.6. Its vision is "an enhanced, traditional downtown serving the community with a variety of destinations in a pedestrian-friendly environment." It calls for increasing the number of residential units, reconnecting the street grid in the commercial core, and providing wider sidewalks and taller buildings along Mathilda Avenue to create a "sense of arrival".

The Plan's goals and policies include bicycle and pedestrian linkages, multimodal access, and use of VTA's bicycle parking standards wherever possible. It encourages reconnection of Murphy Avenue, Taaffe Street, and McKinley Avenue through the core, and the provision of bike lanes on Sunnyvale, Evelyn, and Iowa Avenues (Figure 2.6). It envisions three transition districts of multifamily housing and service retail to buffer adjacent single-family residential areas.

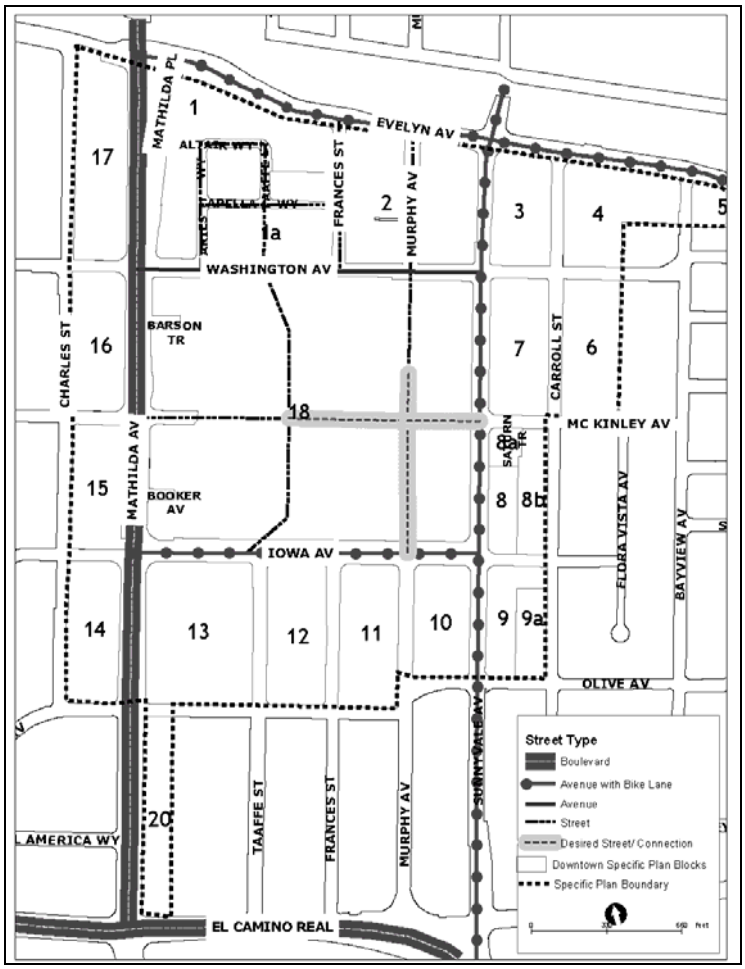


Figure 2.6: Downtown Specific Plan Street Character
(2003 Downtown Specific Plan, Figure 7.1)

2.3 Bicycle Commuting

Bicycle commuting, also known as "utility" cycling, includes trips to work, school, shopping and appointments. In the Bay Area, many workplace commutes also involve bicycling to transit and/or bringing a bicycle aboard transit vehicles. This section describes adult "journey to work" bicycle trips, bicycling to Sunnyvale public schools, and the transit options and facilities available to cyclists. It also projects the amount of increase in bicycle commuting expected to result from facility improvements.

2000 U.S. Census

The Association of Bay Area Governments provides a summary of U.S. Census 2000 data for each Bay Area city. Sunnyvale's bicycle mode share of adult journey-to-work trips in 2000 was under 1%, generally typical for cities in Santa Clara County. Because the Census commute data is single-mode, bike-to-transit and bike-on-transit trips discussed in Section 2.4 would be counted as public transportation trips. This data does not count bicycle commutes by students to schools, summarized later in this section.

Table 2.3: US Census 2000 commute data for Sunnyvale

ALL MODES (Sunnyvale residents only)		
Commute mode	**Count**	**Share**
Car, truck, or van:	64,975	90.6%
Drive alone	57,492	80.1%
Carpool	7,483	10.4%
Public Transportation	2,702	3.8%
Bus or trolley bus	1,865	2.6%
Streetcar or trolley car	25	0.0%
Subway or elevated	42	0.1%
Railroad	735	1.0%
Ferryboat	0	0.0%
Taxicab	35	0.0%
Motorcycle	268	0.4%
Bicycle	**526**	**0.7%**
Walked	1,106	1.5%
Worked at home	1,878	2.6%
Other means	281	0.4%
Total	**71,736**	**100.0%**

BICYCLE COMMUTING (all)				
Intra-city (Sunnyvale to Sunnyvale)			**225**	
Inbound from…		**Outbound to…**		
San Jose	110	Santa Clara	90	
Santa Clara	80	Mountain View	60	
Mountain View	75	Cupertino	45	
Palo Alto	35	Palo Alto	40	
Cupertino	25	Milpitas	20	
Campbell	10	Stanford	20	
Gilroy	10	San Jose	15	
Burbank*	4	Loyola**	4	
Menlo Park	4			
Redwood City	4			
Other SC County	15			
Other SM County	4			
Inbound	**376**	**Outbound**	**294**	**33%**
		Inbound	**376**	**42%**
		Intra-city	**225**	**25%**
		Total	**895**	**100%**

Source: US Census 2000, Census Transportation Planning Package

SC Co = Santa Clara County, SM Co = San Mateo County

** Burbank is a Census-designated unincorporated area near the I-880 / I-280 interchange (Valley Fair Mall / Santana Row vicinity).*

*** Loyola (Loyola Corners) is a Census-designated unincorporated area near the Foothill Expressway / Loyola Driver interchange.*

The minor discrepancy between the 526 resident bicycle commuters shown under Commute Mode and the 519 obtained by adding Outbound and Intra-city is unexplained.

2005 Moffett Park employee survey (adult workers)

The Moffett Park Business and Transportation Association (MPBTA) is a collaboration between the City and employers in the Moffett Park area north of Highway 237. In late 2005, MPBTA conducted a voluntary employee commute survey of eight Moffett Park companies (Ariba, Interwoven, Juniper, Labcyte, Marvell, Motorola, Network Appliance and Yahoo) plus City employees throughout Sunnyvale, for the two-week period October 24 – November 4.

The total estimated employment of the companies surveyed plus the City was 10,629. Over 4,600 responses were received – a 43% response rate. 94.1% of respondents said they work a five-day workweek. 1.5% said they bicycled to work, and an additional 0.8% combined a bicycle with transit. It is worth noting that the survey was conducted in late October, after the end of Daylight Savings Time and the start of the usual rainy season. By comparison, Sunnyvale's Census 2000 bike commute percentage was 0.7%.

Table 2.4: Moffett Park 2005 survey: Commute Mode, 5-day average

Mode	Count	Share
Drive Alone	3,071	66.6%
Carpool	510	11.0%
Public transit	363	7.9%
Telecommuting	177	3.8%
Employer-provided shuttle	100	2.2%
Bicycle	**67**	**1.5%**
Electric / Hybrid	63	1.4%
Motorcycle / Moped	61	1.3%
No response	58	1.2%
Public transit in combination with bicycle	**37**	**0.8%**
Traveling for business	31	0.7%
Other day off (vacation, sick)	26	0.6%
Regular Day Off (compressed week)	18	0.4%
Walk	13	0.3%
Reported to another worksite	10	0.2%
Vanpool (7+ people)	7	0.1%
Total	4,612	100.0%

Table 2.5: Moffett Park 2005 survey: Commute Distance (all modes)

Distance	Count	Share
0.0 – 0.9 miles	44	1.0%
1.0 – 2.9 miles	151	3.3%
3.0 – 4.9 miles	341	7.4%
5.0 – 9.9 miles	932	20.2%
10.0 – 14.9 miles	801	17.4%
15.0 miles or more	2,343	50.8%
No answer	117	2.5%
Total	4,612	100.0%

74.3% of drive-alone respondents said they would consider using an alternative mode on an occasional basis. Of 24 possible ways that might encourage them, "safe,

convenient bike paths and routes" ranked #7; improved workplace bike facilities such as showers and bike lockers ranked last. Telecommuting and "emergency ride home" ranked #1 and #2 respectively.

One survey question asked for additional comments. Common concerns of those who already bike to work, or would like to, were:

- "Unsafe [bikeways] require an experienced bicyclist"
- "Traffic is too fast and drivers ignore the safety of bicyclists"
- "[Bikeways] are not connected between cities and are not maintained"

Based on the results of this survey, it appears likely that the addition of the Borregas Avenue bicycle/pedestrian bridges over US-101 and Highway 237 will encourage many more Moffett Park workers to try bicycling to work.

Projected increase in bicycle commuting

It is expected that the bikeway network additions and enhancements described in this Plan will significantly increase the use of bicycles for utility transportation and recreation. Among the improvements anticipated during this Plan's time horizon are closures of four key gaps affecting home-to-work trips:

- The Borregas Avenue bicycle-pedestrian bridges over US-101 and Highway 237, expected to open in 2009, will connect Moffett Park workplaces and the Sunnyvale Baylands recreational area with the residential southern areas of the City, and will provide a direct connection to Caltrain via Sunnyvale Avenue. They will create the first north-south route into Moffett Park with the directness, comfort, and safety desired by many potential bicycle commuters, including those who responded to the 2005 survey by the Moffett Park Business and Transportation Association (MPBTA) as described in the following section.

- The Mary Avenue bicycle-pedestrian bridge across I-280, a Cupertino project expected to be constructed in 2007, will connect Sunnyvale residents north of I-280 with Cupertino destinations such as De Anza College and the office parks along Bubb Road. It should produce a substantial increase in bicycle commute trips because the existing route to the west traverses the Foothill Expressway / I-280 interchange and involves substantial descending and climbing.

- The Bernardo Avenue bicycle-pedestrian undercrossing of the Caltrain line, combined with Bernardo's existing signal on Central Expressway, will connect nearby Mountain View workplaces to residences south of the railroad. It would reduce bicycle commute distances to NASA's Ames Research Center via the Ellis St. / US-101 interchange. This undercrossing is programmed in the Bicycle Expenditure Plan for 2016 and is in the City's budget.

- The Mary Avenue Extension over US-101 and Highway 237 to the 11th Avenue area near Lockheed would further connect Moffett Park with Sunnyvale residences, complementing the Borregas Avenue bridges to the east. This project is in the conceptual engineering and environmental clearance phase. It is not fully funded, and may be built within seven to 15 years.

- The Calabazas Creek undercrossing of Tasman Drive will connect cyclists from residences south of Tasman Drive to workplaces on the north side without having to ride on Lawrence Expressway. This undercrossing is envisioned to be available during low-water conditions (dry season, and non-storm periods during the rainy season).

The addition of the Borregas Avenue and Mary Avenue bicycle-pedestrian bridges will provide direct and pleasant routes for many bicycle commute trips. Completion of the City's entire bikeway network as defined in the Bicycle Capital Improvement Program will substantially improve directness and bicyclist comfort levels on key arterial roadway segments especially in the north-south direction. Together these enhancements are expected to double commuting within, into, and out of Sunnyvale to approximately 1,800 daily round-trips from the current total of approximately 900 (US Census 2000).

These figures omit bike-on-transit trips, which the U.S. Census counts as transit trips. Bike-on-train trips via Sunnyvale's downtown Caltrain station are expected to increase substantially when the Borregas Avenue bridges and bike lanes on Evelyn Avenue are completed. This will substantially increase the number of commuters who leave home and arrive at work by bicycle.

Bicycling to Schools

Existing bike-to-school activity was estimated for public schools in Sunnyvale, and the on- and off-street routes available for students to bike to each school were inventoried. The location and quality of each school's bicycle parking area was noted, along with its proximity and accessibility from student bicycle commute routes. School and district staff provided low-to-high ranges of the numbers of students who bicycle on favorable days.
By age 10, most children can safely bicycle to school on their own using low-volume neighborhood streets, though many younger children bicycle with their parents. Accordingly, Grades K-2 were omitted from the bicycling rate calculations. Students bused to school were also omitted because it was assumed that they do not live within reasonable bicycling distance.

SUNNYVALE'S BIKE-TO-SCHOOL ENVIRONMENT

Public schools in Sunnyvale report a wide range of student bicycle commute rates. Several factors influence the convenience of bicycling to school, by itself and as a choice relative to other modes such as walking. Almost all Sunnyvale neighborhoods have excellent sidewalk networks and many residences are within a 10-minute walk of their elementary school, so many elementary school students walk to school.

Although crossings of collector and arterial streets can be difficult for student cyclists, many such crossings in Sunnyvale are controlled by a crossing guard during school commute periods. This effectively connects bike-to-school routes across those streets.

Many students are driven to school by a parent or guardian, including most of those who live at a considerable distance or beyond a major street or highway barrier. Few elementary school students are bused in Sunnyvale unless they:

- Live a considerable distance from school.
  (For example, Ellis Elementary only allows busing for students living 1.25 miles or further away. Fremont High School has a subscription busing program.)
- Live beyond a major barrier such as a freeway
  (one example is Lakewood Elementary's attendance area south of US-101)
- Are Special Education students

SUMMARY OF SUNNYVALE PUBLIC SCHOOL STUDENT BICYCLE COMMUTING

Figure 2.7 summarizes student bicycle commute activity for all public elementary, middle, and high schools in Sunnyvale, as estimated by school staff and school district administrators. Enrollment data is a one-day snapshot from March 6, 2006.

The results indicate that an average of between 5% and 6.5% of all students eligible to bicycle (Grades 3 and up, and not bused) do so on favorable days. However, the estimated rate varies considerably between schools, from under 2% to over 20%. Four elementary schools – Cherry Chase, Ponderosa, Stocklmeir, and West Valley – have rates of 10% or higher; at Stocklmeir about one in five eligible students arrive by bike. The wide variation may be attributable to home-to-school distance distributions, bicycle route connectivity, the cost of bicycles for low-income families (cited by one school's staff), student age (older teens are presumably more focused on car ownership, and may drive to jobs), and possibly by varying levels of encouragement for bicycling.

School Bicycle Commute Statistics

Spring 2006

SCHOOL DISTRICTS with schools in Sunnyvale

Name	Abbr	ES	MS	HS	Bike To School policy
Cupertino Union School District	CUSD	3	1	0	Grade 3 and up unless accompanied by adult
Fremont Union High School District	FUHSD	0	0	1	No restrictions
Santa Clara Unified School District	SCUSD	2	1	0	No restrictions
Sunnyvale School District	SSD	8	2	0	Grade 3 and up
		13	**4**	**1**	

KEY
ES = Elementary School
MS = Middle School
HS = High School
K = Kindergarten

SCHOOLS

ELEMENTARY

	District	K	1	2	3	4	5	Total	Bused	3-4-5 Total	3-4-5 Bused	Total OK to bike	Bike To School Low Est.	Bike To School High Est.	Bike% Low	Bike% High
Bishop	SSD	100	100	118	97	116	95	626		308		308	10	20	3.2%	6.5%
Braly	SCUSD	57	50	62	49	51	30	321	65	130	20	110	5	10	4.5%	9.1%
Cherry Chase	SSD	116	100	80	79	76	63	514		218		218	20	20	9.2%	9.2%
Cumberland	SSD	99	80	97	72	78	74	500	25	224	15	209	25	35	12.0%	16.7%
Ellis	SSD	99	95	98	98	94	81	565		273		273			0.0%	0.0%
Fairwood	SSD	59	51	53	37	45	48	293		130		130	0	0	0.0%	0.0%
Lakewood	SSD	80	80	72	80	99	92	503		271		271	5	5	1.8%	1.8%
Nimitz	CUSD	85	69	113	93	101	89	550	34	283	0	283	10	20	3.5%	7.1%
Ponderosa	SCUSD	76	90	99	72	75	71	483	0	218	0	218	25	30	11.5%	13.8%
San Miguel	SSD	78	75	60	77	81	64	435		222		222	2	5	0.9%	2.3%
Stocklmeir	CUSD	148	109	120	110	110	109	706	0	329	0	329	60	75	18.2%	22.8%
Vargas	SSD	101	92	91	98	82	87	551	30	267	15	252	10	20	4.0%	7.9%
West Valley	CUSD	89	89	87	100	102	128	595	0	330	0	330	30	40	9.1%	12.1%
					1062	**1110**	**1031**	**6642**	**154**	**3203**	**50**	**3153**	**202**	**280**	**6.4%**	**8.9%**

MIDDLE

	District				6	7	8	Total	Bused			Total OK to bike	Bike To School Low Est.	Bike To School High Est.	Bike% Low	Bike% High
Columbia	SSD				261	319	277	857				857	30	50	3.5%	5.8%
Cupertino	CUSD				370	378	418	1166	15			1151	100	100	8.7%	8.7%
Peterson	SCUSD							996	350			646	30	50	4.6%	7.7%
Sunnyvale	SSD				303	311	329	943				943	40	40	4.2%	4.2%
					934	**1008**	**1024**	**3962**	**365**			**3597**	**200**	**240**	**5.6%**	**6.7%**

HIGH

	District			9	10	11	12	Total	Bused			Total OK to bike	Bike To School Low Est.	Bike To School High Est.	Bike% Low	Bike% High
Fremont	FUHSD			486	446	522	402	1856	554			1302	25	35	1.9%	2.7%
Homestead	FUHSD			567	589	504	429	2089								
				1053	**1035**	**1026**	**831**	**3945**	**554**			**1302**	**25**	**35**	**1.9%**	**2.7%**
								14549	**1073**			**8052**	**427**	**555**	**5.3%**	**6.9%**

NOTES

1 Enrollment excludes Special Education students
2 Calculations assume all bused students are outside bicycling range.

Figure 2.7: School bicycle commute data

Figures 2.8 shows all school locations and the attendance boundaries of public elementary schools in Sunnyvale. Appendix G contains maps and details of bike to school conditions for each public elementary, middle, and high school in the City.

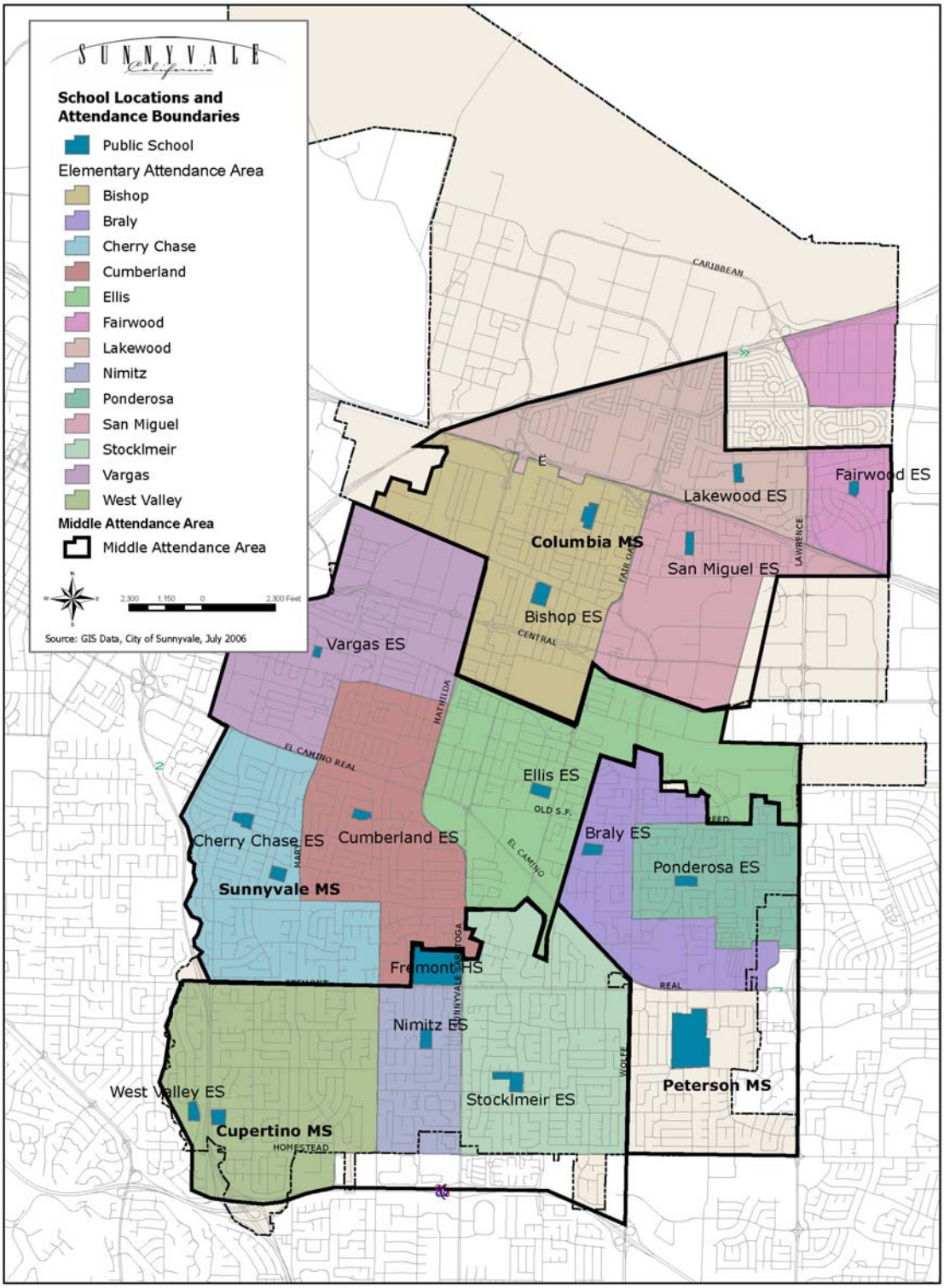


Figure 2.8: School Locations and Attendance Boundaries

2.4 Bicycling and Transit

The Bay Area is a national leader in the integration of bicycles and transit. Almost all transit systems in the region accommodate bicycles aboard, and some systems such as Caltrain provide relatively high on-board bicycle capacity.

Sunnyvale is situated at the southern end of the San Francisco Peninsula, whose relatively narrow developed area has concentrated development along the historic rail corridor now used by the Caltrain commuter rail line. Sunnyvale is served by Caltrain and by VTA's Light Rail line, transit buses, and shuttle buses serving the Great America commuter rail station at Tasman Drive and Lafayette Street. That station is the northernmost stop in Santa Clara County for Altamont Commuter Express (ACE) trains serving southern Alameda County and the Central Valley, and for Capitol Corridor trains serving the East Bay and I-80 corridor to Sacramento.

Caltrain

Sunnyvale has two Caltrain stations: Sunnyvale (downtown) and Lawrence. The downtown station is located on Evelyn Avenue between Mathilda Avenue and Frances Street, with a parking garage on site and a major bus transfer station on Frances and Evelyn. The Lawrence Station is located under Lawrence Expressway, with access to Kifer Road, Reed Avenue, Evelyn Avenue (via Aster Avenue) and Martin Avenue. Some bike-and-train commuters to Moffett Park workplaces use the Mountain View Caltrain station, crossing under US-101 via the Ellis Street interchange and using Manila Drive and Moffett Park Drive to reach Sunnyvale.

RIDERSHIP

In Caltrain's 96-weekday-train schedule dated January 1, 2006, the two stations are served by 62 and 60 weekday trains respectively. Based on February 2006 average weekday boardings the two stations ranked #8 and #17 respectively among Caltrain's 34 stations. The downtown station has 4.2% of all Caltrain boardings and is the fourth busiest in Santa Clara County after Palo Alto, Mountain View, and downtown San Jose, which are all major express train ("Baby Bullet") stops.

Below are annual weekday average boardings from the start of service in 1992, and weekday average total and bicyclist on/off data since 2000 except for 2002 bicyclist data. Data from 1992 to 2001 reflects the addition of more weekday trains. The area experienced an economic downturn in 2002 and 2003. Data for 2004 and later reflects the shift to a limited-stop-based timetable favoring busier stations, following track and signal upgrades to enable trains to pass each other. In 2006, the downtown station had a substantial increase in total boardings and a smaller but significant increase in bicyclist boardings.

Table 2.6: Caltrain average weekday boardings since start of Caltrain service

Station	Oct 92	Oct 93	Mar 94	Feb 95	Mar 96	Feb 97	Feb 98	Feb 99	Feb 00	Feb 01	Feb 02	Feb 03	Feb 04	Feb 05	Feb 06
Sunnyvale	814	883	872	828	1001	1204	1214	1230	1363	1427	1222	1020	1149	970	1342
Lawrence	601	601	575	558	687	822	965	981	1124	1309	956	773	593	534	514

Source: San Mateo County Transit District (Samtrans), April 2006

Table 2.7: Caltrain average weekday on/offs including bicyclists, 2000-2006

	2000		2001		2002*		2003		2004		2005		2006	
Station	**On**	**Off**	**On**	**Off**	**On**	**Off**	**On**	**Off**	**On**	**Off**	**On**	**Off**	**On**	**Off**
Sunnyvale	1363	1390	1427	1414	1222	1178	1020	1011	1149	1163	970	960	1342	1333
Bicyclists	72	72	82	77	Data incorrect		65	63	82	92	80	80	93	88
%Bicyclists	5.3%	5.2%	5.7%	5.4%			6.4%	6.2%	7.1%	7.9%	8.2%	8.3%	6.9%	6.6%
Lawrence	1124	1143	1309	1300	956	956	773	753	593	615	534	561	514	535
Bicyclists	67	66	70	72	Data incorrect		52	49	46	44	47	43	48	47
%Bicyclists	6.0%	5.8%	5.3%	5.5%			6.7%	6.5%	7.8%	7.2%	8.8%	7.7%	9.3%	8.8%

Source: San Mateo County Transit District (Samtrans), April 2006

Caltrain's most recent counts show 2,271 average weekday bicycle boardings (all stations).

The increase in bicyclists as a percentage of total boardings from 2003 to 2005 is significant, and is probably attributable to the introduction in 2003 of "Baby Bullet" express trains that reduce travel time to San Francisco to 49 minutes with only 3 stops midway, making a bike-train-bike commute very competitive with freeway driving. The current (October 2005) timetable provides three hourly AM expresses from Sunnyvale to San Francisco, and three hourly PM express returns. In contrast, the "reverse commute" (AM southbound, PM northbound) takes about 60 minutes each way. This is because no reverse-commute expresses serve Sunnyvale, only "limited-stop" trains that skip most stops on half of the Peninsula but make all stops in Santa Clara County.

Figure 2.9: Boarding old-style Caltrain bike car at Sunnyvale station

BICYCLE ACCESS

On board

All Caltrain trains have dedicated on-board bicycle storage space. Most trains use cab and gallery cars that have been in service since the three counties purchased the line in 1992. On these trains all cab cars are bike cars and have 32 bike spaces (eight four-bike racks) occupying over half of the main level in one half of the car. Each such train has one bike car (32-bike capacity) and sometimes two (64-bike capacity).

"Baby Bullet" railcars added in 2003, made by Bombardier, have a "tri-level" layout with long lower and upper seating levels spanning the car's length between the wheels and short "mezzanine" levels at each end, linked to the lower and upper levels by half-stairways. Bike cars of this type accommodate only 16 bicycles. All trains using Bombardier cars have at least one bike car (16-bike capacity) and some have two (32-bike capacity).

Downtown ("Sunnyvale") station

The downtown ("Sunnyvale") station is well connected for bicycle feeder trips. The platform and station area can be accessed from Evelyn Avenue at both Frances Street and Mathilda Place, and via an informal access point on Hendy Avenue at Frances Street. The station currently has two tracks with at-grade pedestrian crossings between the north and south platforms. In the north-south direction, Sunnyvale Avenue is a nearby parallel alternative to busy Mathilda Avenue. South of Evelyn Avenue, Sunnyvale Avenue has bike lanes that cross El Camino, connecting Caltrain cyclists to the southern half of Sunnyvale's bikeway network and to Cupertino via Sunnyvale-Saratoga Road. In the east-west direction, just north of the Caltrain line, Hendy Avenue connects east to Fair Oaks Avenue, and California Avenue connects to nearby workplaces west of Mathilda, and to Mary Avenue workplaces beyond. South of the Caltrain line, bike lanes are funded on the full length of Evelyn Avenue, connecting to existing bike lanes in Mountain View to that city's downtown. An alternative "neighborhood" route to Mountain View uses Washington Avenue and Dana Street.

Connections to this station will improve due to planned bicycle route network improvements and changes to the downtown circulation. Caltrain, in coordination with the City and VTA, plans to provide an ADA-compliant path to the north platform from the intersection of Hendy Avenue and Frances Street, replacing the existing unimproved access. The addition of the Borregas Avenue bicycle-pedestrian bridges over US-101 and Highway 237 is expected to substantially increase bicycle use of Sunnyvale Avenue and bicycle trips and bike-on-Caltrain activity associated with the station. The station's planned future configuration will have four tracks and a pedestrian undercrossing – features already present at the Lawrence station. An undercrossing is preferable to an overcrossing because of Caltrain's 27-foot vertical clearance requirement.

Figure 2.10: Sunnyvale (Downtown) Caltrain station context
Red dots indicate traffic signals

BICYCLE ACCESS

Evelyn Avenue (E-W)
Shared Roadway, future Bike Lanes

Hendy Avenue (E-W)
Shared Roadway

Washington Avenue (E-W)
Shared Roadway (beginner) to west

Sunnyvale Avenue (N-S)
Bike Lanes to south
Shared Roadway (intermediate) to north

California Avenue (E-W)
Shared Roadway (beginner)

Lawrence station

The Lawrence Caltrain station is also fairly well connected for commuter bicycling and is close to many tech workplaces. The recent reconstruction of the station has made it possible to walk a bicycle between the south and north platforms via a tunnel. The north platform is connected to Kifer Road by San Zeno Way on the west side of Lawrence Expressway, and by Lawrence Station Road on the east side. The south platform is connected to Reed Avenue by Willow Avenue, to Evelyn Avenue via Aster Avenue, and to Monroe Street by French Street.

In the north-south direction, Lawrence Expressway has fairly narrow striped shoulders, high traffic volumes, and frequent commercial driveway interactions north of Kifer Road. Because there is no crossing of Central Expressway between Lawrence and Wolfe Road, reaching workplaces in the Arques Avenue / Stewart Drive complex west of Lawrence requires either riding on Lawrence or detouring via Wolfe, which has bike lanes north of Reed Avenue. In contrast, the Oakmead Parkway employment center can be reached via Kifer and Corvin Drive. These circulation conditions in the station's northwest quadrant are a significant obstacle to bicycle access.

In the east-west direction, Kifer Road provides a comfortable route north of the Caltrain line, with bike lanes west of Lawrence (within Sunnyvale) and wide outside lanes east of Lawrence (within Santa Clara). South of the Caltrain line, there are bike lanes on Reed Avenue, Willow Avenue, and Aster Avenue to the west and a bike route on Monroe Avenue to the east.

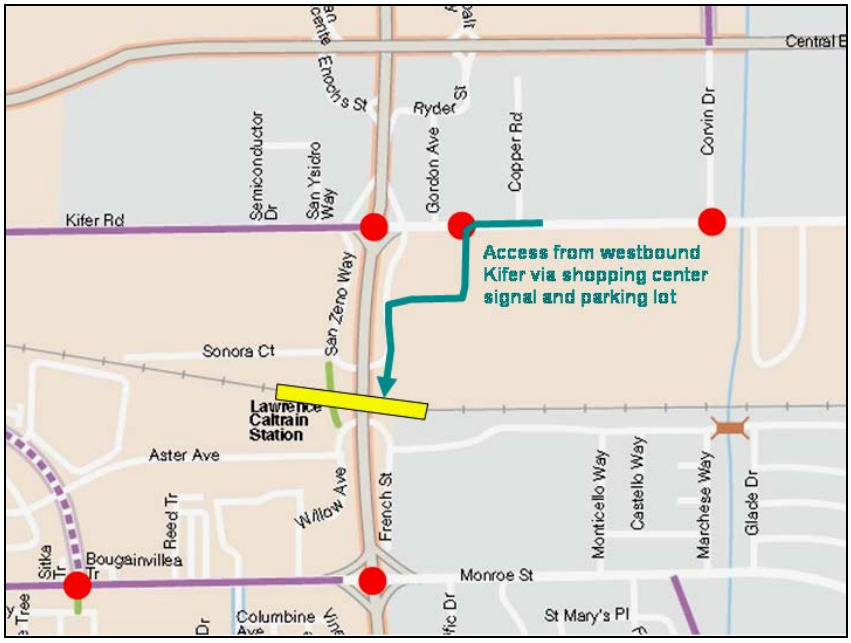


Figure 2.11: Lawrence Caltrain station context
Red dots indicate traffic signals

BICYCLE ACCESS

Lawrence Expwy (N-S)
Striped shoulders,
High volumes of fast traffic

Kifer Road (E-W)
Bike Lanes west of Lawrence, wide outside lanes east of Lawrence (City of Santa Clara)

Reed Avenue (E-W)
Bike lanes
west of Lawrence

Monroe Avenue (E-W)
"Intermediate bike route"
east of Lawrence
(City of Santa Clara)

Trips from the north platform to eastbound Kifer signal use Lawrence Station Road, but there is no westbound left turn into Lawrence Station Road so most cyclists turn left at the Costco signal just east of Gordon Avenue and proceed south and then west through the Costco parking lot onto Lawrence Station Road.

END-OF-TRIP FACILITIES

Both Caltrain stations have bike lockers available for monthly rental. The Sunnyvale (Downtown) station also has day-use lockers that accept user-provided padlocks, but misuse of these units by homeless persons has been an issue and they are currently removed from service. To address this issue, the City plans to install day-use lockers with electronic locks operated by cards or fobs assigned to users.

Table 2.8: Caltrain station bike locker rental activity

Caltrain station	Ridership	Bike spaces	Rented	Rented %	Available
Sunnyvale	1,342	76	24	31.6%	52
Lawrence	514	43	18	41.9%	27
Total	**1,856**	**119**	**42**	**35.3%**	79

Source: San Mateo County Transit District (Samtrans), February 2006

Demand for bicycle lockers at Sunnyvale's two Caltrain stations increase with the availability of bicycle storage at other stations. For example, the Palo Alto Bikestation, an attended bicycle storage facility, has been closed for station improvements for over a year but is scheduled to reopen in mid-2006. Another attended bike station is currently being constructed at the main San Francisco station at Fourth and Townsend Streets. When these facilities are open, some bicyclists may choose to avoid on-board bicycle capacity limitations and bike car congestion by opting for a "two-bike" commute solution, storing one bicycle in San Francisco or Palo Alto and another in a locker in Sunnyvale. Caltrain periodically promotes this option in order to better utilize onboard bicycle space.

VTA Light Rail

RIDERSHIP AND END-OF-TRIP FACILITIES

VTA's Tasman West light rail line has seven stations in Sunnyvale. Figure 2.12 shows their locations in the context of the City's bikeway network.

Table 2.9 summarizes ridership and bicycle locker usage by station. VTA charges no rent for its bicycle lockers. A $25 deposit covers re-keying if a key is lost.

ON-BOARD ACCESS

Each Light Rail car can accommodate eight bicycles, four in vertical hanging racks and four more held by standing cyclists in the articulated area of the cars. Peak-period trains through Sunnyvale typically have two cars (16 bicycles capacity) and run every 15 minutes. Off-peak trains run every 30 minutes and have one car (eight bicycles capacity).

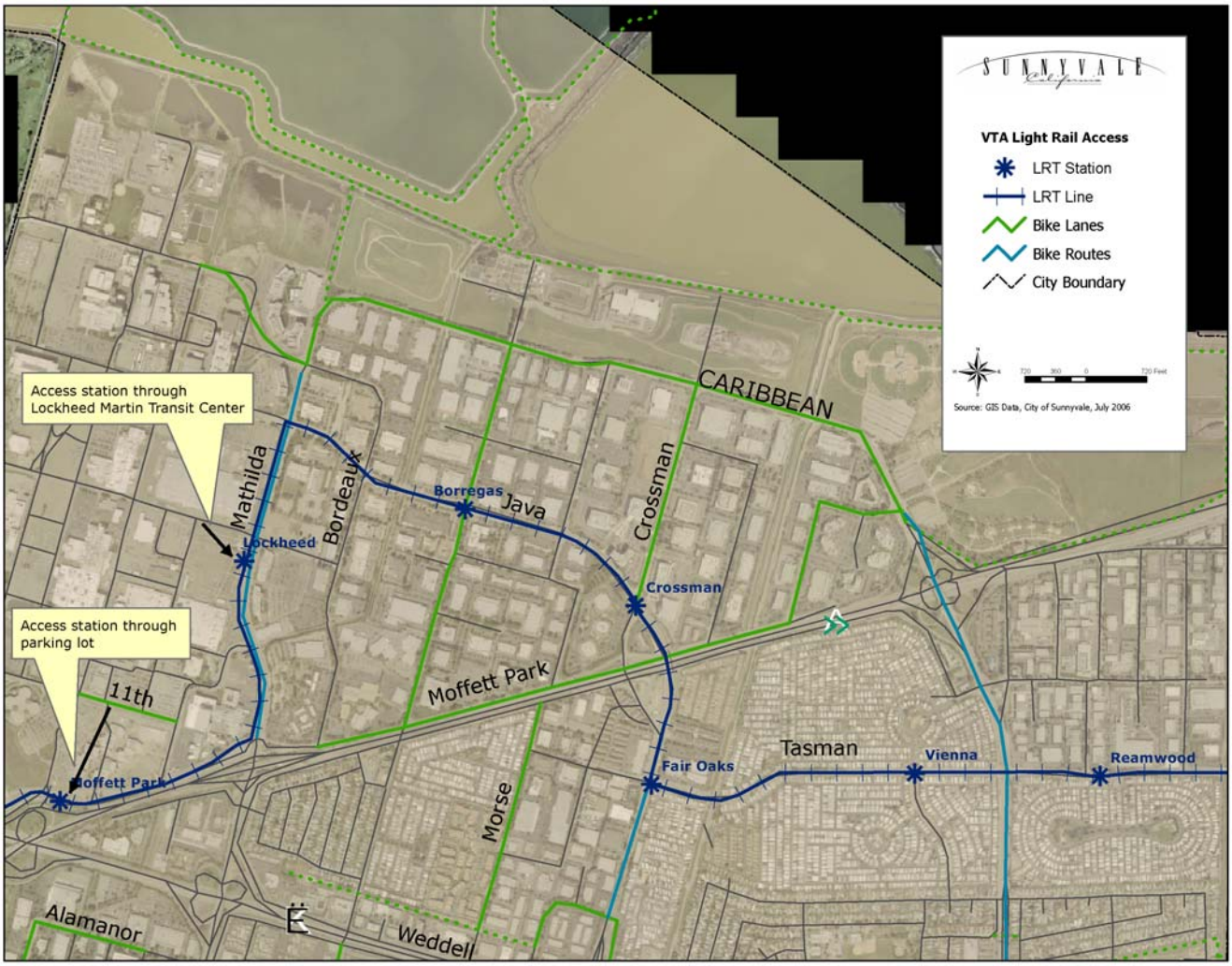


Figure 2.12 VTA Light Rail station access from Sunnyvale bikeway network

Table 2.9: Sunnyvale Light Rail station ridership and bicycle locker usage

Light Rail station	Ridership	VTA bike spaces	Rented	Rented %	Available
Moffett Park	42	0	0		0
Lockheed Martin	164	16	16	100%	0
Borregas	55	0			
Crossman	33	0			
Fair Oaks	226	12	12	100%	0
Vienna	91	0			
Reamwood	82	0			
Total	**693**	**30**	**30**	**100%**	**0**

Ridership source: VTA Bicycle Program, April 2006 (all passengers, not only those with bicycles)
Ridership data: Average weekday total boardings and alightings, July-December 2005
File: FY 2006 LR AVG WEEKDAY RIDERSHIP BY STN.xls
Bicycle locker data: VTA, February 2006.

Although VTA has no bicycle lockers at the Moffett Park station, the adjacent office complex provides 36 bicycle locker spaces for its employees who commute by bicycle (not in combination with Light Rail).

Ridership of the Fair Oaks station is expected to increase as multifamily housing replaces light industrial buildings in the adjacent Tasman-Fair Oaks "Industrial To Residential" area.

VTA does not count bicyclist boardings by station, but Light Rail operators conduct annual system-wide one-day counts. Table 2.10 shows the results for 2004 and 2005.

Table 2.10: VTA Light Rail system-wide bicycle boardings

	AM Non-Peak	AM Peak	Midday	PM Peak	PM Non-Peak	Totals	%Change from prev. year
	12am-6am	6am-9am	9am-3pm	3pm-6pm	6pm-12am		
2004	33	179	218	234	156	820	+17.4%
2005	**67**	**253**	**320**	**245**	**222**	**1,107**	**+35%**
2005 % of Total	6.1%	22.9%	28.9%	22.1%	20.0%		

Source: VTA Bicycle Program Coordinator, April 2006.
Data: One-day on-board tally by operators. 2005 date: October 12
File: LR BIKE_SURVEY05-1.doc

STATION ACCESS

The following tables describe the area served by each Light Rail station in Sunnyvale, and planned bikeway network additions that would improve access.

Moffett Park Station

Location	North side of Moffett Park Drive between H Street and Lockheed Martin Way
Area served	Lockheed Missiles & Space Company and other workplaces in the area north of US-101 and west of Mathilda Avenue
Future access	Mary Avenue Extension over US-101 and Highway 237, probably to 11th Avenue

Lockheed-Martin Station

Location	West side of Mathilda Avenue between 5th Avenue and 6th Avenue Bus transit center on south side of 5th Avenue between Mathilda and C Street
Area served	Workplaces in the "Lockheed" area north of US-101 and west of Mathilda Avenue, also on Bordeaux Drive via 5th Avenue
Future access	Mary Avenue Extension over US-101 and Highway 237, probably to 11th Avenue

Borregas Station

Location	Median of Java Drive just west of Borregas Avenue (Moffett Park)
Area served	Workplaces on Java Drive, Borregas Avenue, and nearby streets
Future access	Borregas Avenue (N-S): Bike bridges over Highway 237 and US-101

Crossman Station

Location	Median of Java Drive just west of Crossman Drive (Moffett Park)
Area served	Workplaces on Java Drive, Crossman Drive, Moffett Park Drive (east and west of Java), and east of Crossman Drive
Future access	Borregas Avenue bicycle bridges over Highway 237 and US-101

Fair Oaks Station

Location	Median of Tasman Drive just east of Fair Oaks Avenue
Ridership	226 (July-December 2005; see Table 2.9) Expected to increase as Tasman-Fair Oaks housing opens
Area served	Tasman - Fair Oaks housing. Fox Hollow and El Dorado Mobile Home Parks. Weddell Drive workplaces via Fair Oaks, Morse, and future internal street. Casa de Amigos and Plaza del Rey MHPs if pedestrian shortcuts are added.
Future access	Borregas Avenue (N-S): Bike bridges over Highway 237 and US-101
	East Channel (N-S): Pedestrian improvement shown in Tasman / Fair Oaks Bicycle / Pedestrian Circulation Plan. Useful as bicycle link between eastbound Tasman and John W. Christian Greenbelt.

Vienna Station

Location	Tasman Drive at Vienna Avenue, just west of Lawrence Expressway
Area served	Casa de Amigos and Plaza del Rey Mobile Home Parks
Future access	No changes anticipated

Reamwood Station

Location	Tasman Drive at Reamwood Avenue
Area served	Workplaces north of Tasman Drive, east of Lawrence Expressway, and west of Calabazas Creek. Adobe Wells Mobile Home Park. Residential area south of Adobe Wells MHP via Calabazas Creek Trail.
Future access	Calabazas Creek Trail: low-water undercrossing of Tasman Drive

VTA Buses

VTA operates all transit buses in Santa Clara County; all have two-bike front mounted racks. An additional two bicycles may be brought aboard at driver's discretion, typically at times of day when a given bus is fairly empty.

Figure 2.13 shows ridership at VTA bus stops in Sunnyvale. Many of the busiest bus stops in the City are located on El Camino Real, which is served by VTA's highest-productivity bus line, the 22 Local / 522 Rapid. Other major stops include the downtown Transit Center on Frances Street and Evelyn Avenue at the Sunnyvale Caltrain station, the Lockheed Martin Transit Center and Fair Oaks Avenue at Tasman Drive (Light Rail stations) and Fremont Avenue at Sunnyvale-Saratoga Road (Fremont High School).

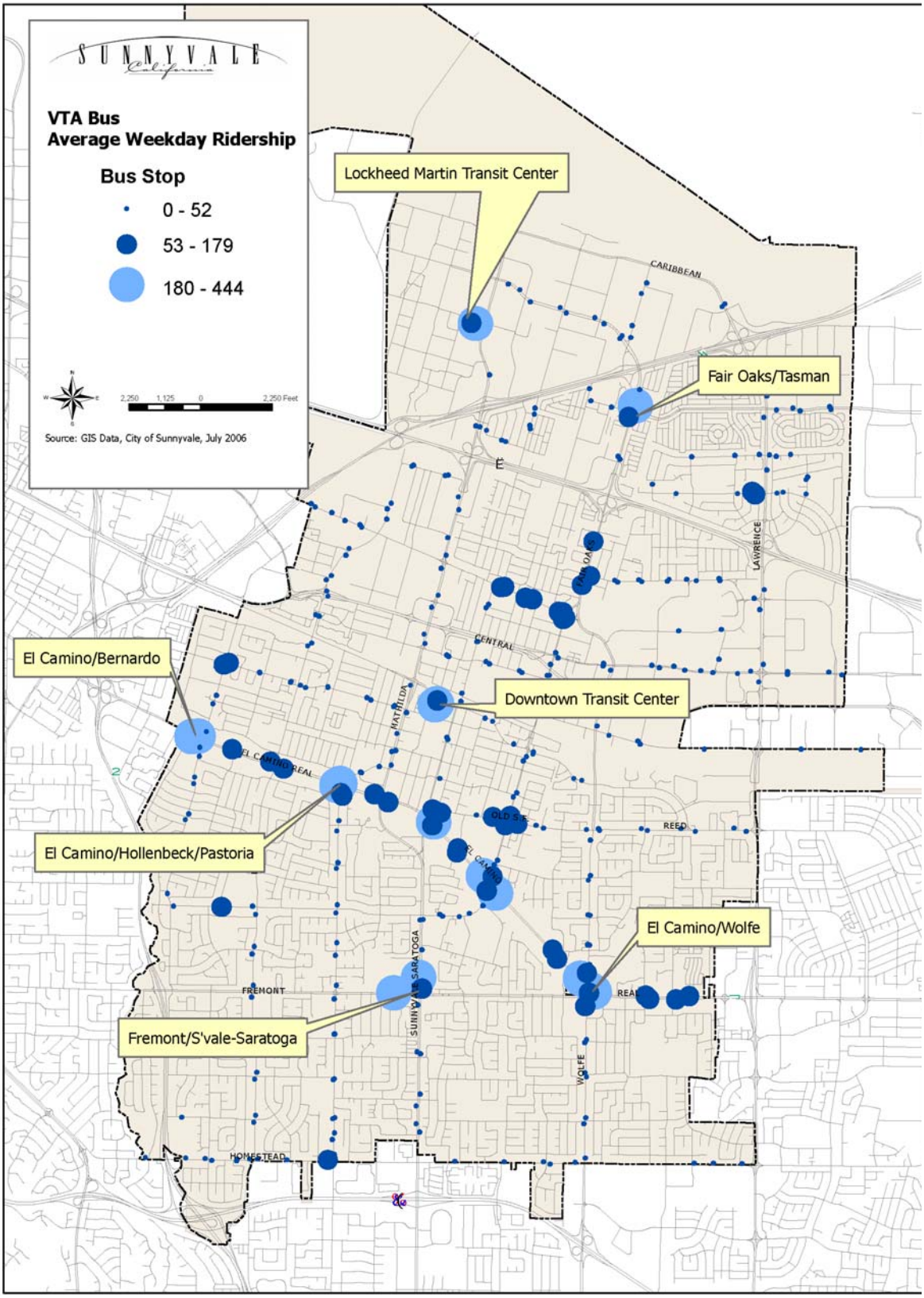


Figure 2.13: VTA bus ridership by stop

VTA does not track bicycle boardings and alightings by bus stop. Table 2.11 summarizes total average weekday boardings and alightings for the seven highest-ridership bus stop clusters. Each sub-table includes the high-ridership stop and immediately adjacent lower-ridership stops.

Table 2.11: Average weekday ridership for major bus stop clusters

Bus stops	Dir	Streets	Routes	On	Off	Total
El Camino / Wolfe	S	Wolfe at El Camino	26	39	98	137
	W	El Camino at Wolfe	22, 522	195	197	392
	E	El Camino at Wolfe	22, 522	174	169	343
	N	Wolfe at El Camino	26	70	108	178
				478	572	**1050**
Downtown Transit Center	S	Frances at Capella	32, 55, 150	161	117	278
	N	Frances at Capella	26, 32, 54, 55	189	231	420
	W	Evelyn at Frances	53, 54	10	2	12
	N	Frances at Capella	53, 140	90	74	164
				450	424	**874**
Fremont / Sunnyvale-Saratoga (Fremont High School)	S	Sunnyvale-Saratoga at Fremont	55	12	270	282
	W	Fremont at Sydney	55	224	6	230
	N	Sunnyvale-Saratoga at Fremont	55	73	13	86
				309	289	**608**
Lockheed Martin Transit Center	E	5th Street at Mathilda	120, 121, 122, 321, 328, ACE	92	110	202
	E	5th Street at Mathilda	26	67	64	131
	E	5th Street at Mathilda	54	20	25	45
				179	199	**378**
Fair Oaks / Tasman (by LRT station)	N	Fair Oaks at Tasman	26, 54	75	161	236
	S	Fair Oaks at Tasman	26	81	5	86
				156	166	**322**
El Camino / Mary	W	El Camino at Mary	22	23	60	83
	E	El Camino at Mary	22	43	38	81
				66	98	**164**
El Camino / Mathilda	W	El Camino at Mathilda	22	36	45	81
	E	El Camino at Mathilda	22	44	38	82
				80	83	**163**

Source: VTA, April 2006

Table 2.12: Bicycle access to major bus stop clusters

Bus stops	Bicycle access
El Camino / Wolfe	Wolfe: Bike lanes south to Cupertino. Shared Lane Markings between El Camino and Reed Avenue. Linden and Gail Avenues form a partial north-south parallel alternative a short distance to the west.
Downtown Transit Center	Evelyn Ave (E-W): Future Bike Lanes Washington Ave (E-W): Bike route to west Sunnyvale Ave (N-S): Bike Lanes south of Evelyn
Fremont / Sunnyvale-Saratoga	Fremont Avenue: Bike lanes Sunnyvale-Saratoga Road: Bike Lanes
Lockheed Martin Transit Center	Manila Drive, H Street, and 5th Avenue from the west. 5th Avenue, Bordeaux Drive, and Moffett Park drive from the east. Caribbean Drive and Mathilda Avenue from the north and east.
El Camino / Mary	Mary Avenue: Bike route north-south Future Mary Avenue Extension bridge over US-101 and Highway 237
El Camino / Mathilda	Sunnyvale-Saratoga Rd: Bike Lanes to south (into Cupertino) Hollenbeck Ave / Pastoria Ave (1 block west): north-south bike route

2.5 Bicycle Parking

Sunnyvale sets an example for office and commercial developments by providing bicycle parking at City buildings and facilities. Bicycle racks and lockers are not currently required at developments except at multifamily residences as addressed by the Zoning section of the Municipal Code. However, transportation planning staff reviews development proposals and applies bicycle parking standards from the VTA Bicycle Technical Guidelines. The following tables summarize bicycle parking facilities at City buildings, in downtown, along El Camino Real, and at transit stations and selected workplaces. Figure 2.15 is a map of bicycle parking at transit stations and public facilities.

Civic buildings

Site	Address	Location	Bicycle parking	#Bikes
City Hall and Public Works	456 W. Olive	Main entrance	(1) 3-wave, 2-side access	6
		Rear entrance	(1) 3-wave, 2-side access	6
		Council entrance	(1) 3-wave, 2-side access	6
		Staff parking lot	(1) 2-door bike locker	2
		Garden Room area	(1) 2-door bike locker	2
Library	Olive Avenue	Entrance plaza	(2) 4-wave racks, 2-side access	16
		Entrance plaza	(1) bike locker (padlock hasps)	2
Community Center	550 E. Remington	Senior Center	(1) 3-wave, 1-side access	4
		Recreation Center	(1) 4-wave, 2-side access	8
		Theatre	(1) 4-wave, 2-side access	8
		Creative Arts Center	(1) 3-wave, 1-side access	4
CA EDD*		Main entrance	(1) PW-Loop-8, 1-side access	8

* State of California Employment Development Department

Downtown

Site	Location	Bicycle parking	#Bikes
Plaza del Sol, Frances at Evelyn	(distributed)	(14) inverted U, 2-side access	28
Bus Transfer Center, Frances	East curb	(2) 3-wave, 2-side access	12
Murphy Avenue parking lot	NE corner	(1) 3-wave, 2-side access	6
Murphy Avenue	Sidewalk	(2) inverted U, 2-side access	4

Bike racks at Caltrain station

Bike rack at Orchard Supply Hardware

Ariba bike lockers at Moffett Park LRT

Shared bike storage room at condominium

Figure 2.14: Bicycle parking and storage examples

Transit stations

Site	Location	Bicycle parking	#Bikes
Sunnyvale Caltrain station	Evelyn at Frances	Lockers, long-term rental (Caltrain)	75
		Lockers, day-use (padlock hasp)	25
		Racks: 15 Creative Pipe LR-P, 1-side	15
Lawrence Caltrain station	Lawrence Expwy at San Zeno Way	Lockers: long-term rental (Caltrain)	43
		Racks: (2) 5-wave, 2-side	22
Lockheed-Martin Light Rail station / Transit Center	Mathilda Avenue at 5th Avenue	Lockers: long term rental (VTA)	16
Fair Oaks Light Rail station	Tasman Drive at Fair Oaks Avenue	Lockers: long-term rental (VTA)	12

Moffett Park businesses (sample)

Employer, Location	Bicycle parking and storage	Clothing storage and changing facilities	Showers
Ariba / Interwoven / Juniper / Motorola complex (Ariba headcount: 366) 807 11th Ave. near Moffett Park Light Rail station	73 bike locker spaces with hasps for user-provided locks	Clothing lockers in fitness center (day-use only; no long-term assignment)	Showers in fitness center and on first floor of Building 2
Juniper Networks 1194 North Mathilda Ave. (in Ariba complex)	Employees use Ariba bicycle lockers Bike racks in front of each Juniper building except A3, total 3 racks each with 10-bike capacity	6 clothing storage lockers for day use by cyclists (not permanently assigned)	3 private shower rooms in Building 1 and also in fitness center (for fitness center members)
Lockheed Martin Multi-building campus north of 11th Avenue and west of Mathilda Avenue	20 bike locker spaces Bike racks at several buildings, capacity approximately 140 bicycles Campus bicycle fleet program for travel within the complex.	Day-use clothing lockers at Fitness Center. In select buildings, a small number of clothing lockers are available for overnight use on a first-come, first-served basis (employees provide own locks).	Showers in Fitness Center, available to all employees. The Fitness Center and showers are not available to contractors.
Yahoo! 701 First Avenue	106 bike locker spaces. 12 are day-use.	Available in Fitness Center for temporary day use	Available to employees in Fitness Center. Showers in 3 other buildings are available to all employees, temps, contractors, and interns.

Central Sunnyvale Businesses (sample)

Business	Address	Bicycle parking	Sides	Bikes
Safeway	1236 W. El Camino	(8) PW-Loop	1	8
Fresh Choice	1105 W. El Camino	(8) PW-Loop	1	8
Chevron Car Wash	1005 W. El Camino	(1) 3-wave	1	4
Camino West plaza	604-620 W. El Camino	(1) Cora-8 in car stall	2	8
(New retail plaza)	SW corner at Mathilda	(1) Bike locker, S. side	2	2
Starbucks	332 W. El Camino	(1) inverted U	2	2
Postal Annex	302 W. El Camino	(1) inverted U	2	2
P.F.Chang's	390 W. El Camino	(1) inverted U	2	2
Orchard Supply Hardware	777 Sunnyvale Saratoga Rd	(8) PW-Loop	1	8
Pak-N-Save Foods	762 Sunnyvale Saratoga Rd	(1) 10-foot comb	2	10
Sports Authority	125 E. El Camino	(1) 3-wave	22	6
Drug Barn	150 E. El Camino	(1) 10-foot comb	1	5
Armadillo Willy's	161 E. El Camino	(1) 10-foot comb	2	10
Camino Medical Group	413 E. El Camino	(1) 3-wave	1	4
Hot Breads	464 E. El Camino	(1) 2-wave	1	0
R&K Comics and Cards	568A E. El Camino	(1) 3-foot comb	1	2
Remington Health Center	500 E. Remington Drive	(8) PW-Loop, in lot	1	8
Best Buy	760 E. El Camino	(1) 2-wave	2	5
Pet Smart	776 E. El Camino	(1) 2-wave	2	5
Rite Aid	777 E. El Camino	(2) inverted U	2	4
Washington Mutual	791 E. El Camino	(1) inverted U	2	2
Blockbuster Video	799 E. El Camino	(1) inverted U	2	2
Bell Plaza	1040-1060 E. El Camino	(2) inverted U	2	4
Carl's Junior	1050 E. El Camino	Park-Rite 5	1	5
Mathilda Place offices	190 Mathilda	2 sets of (3) inverted U	2	12

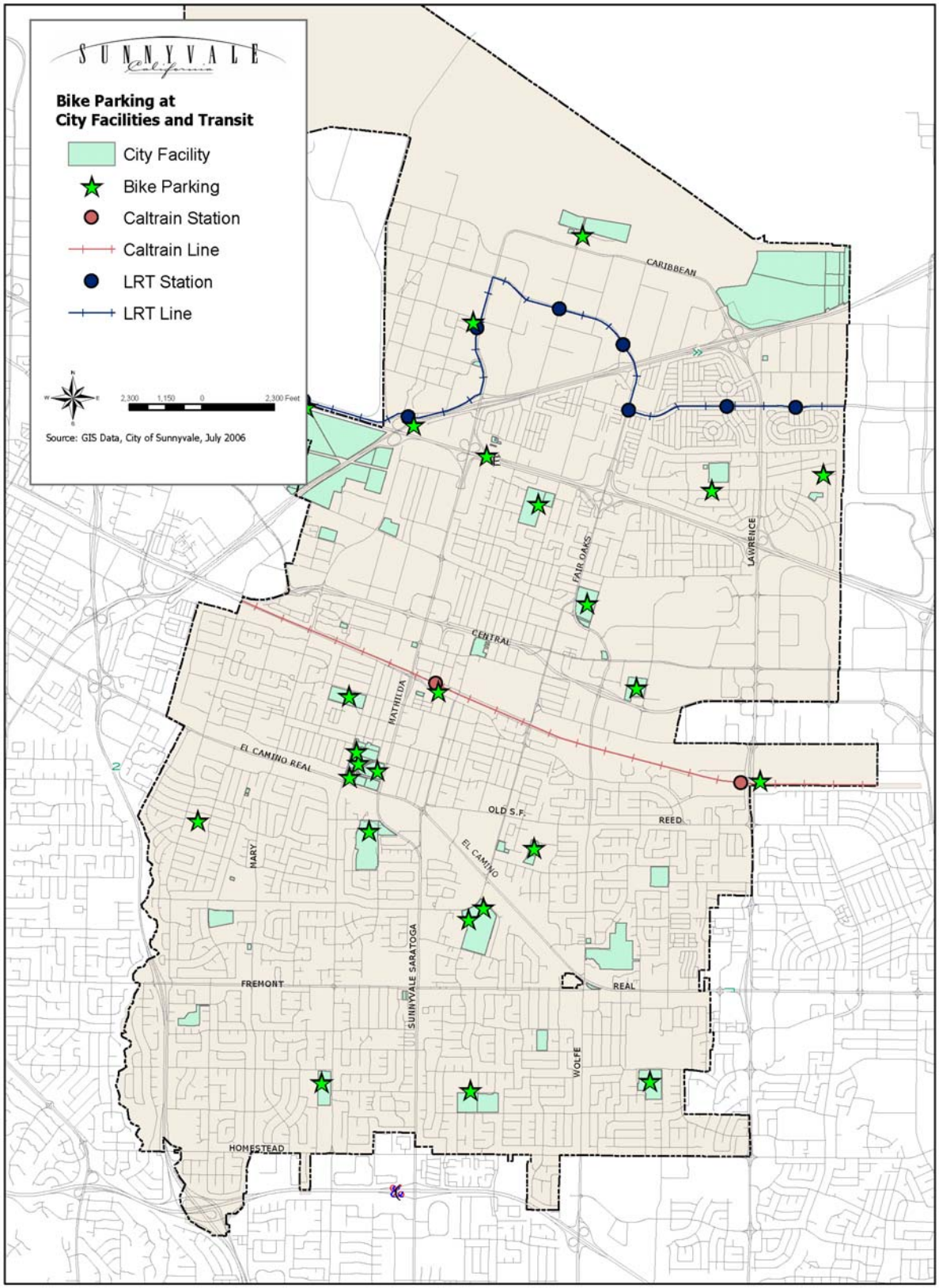


Figure 2.15: Bicycle Parking at Transit Stations and Public Facilities

2.6 Safety

Sunnyvale's transportation staff regularly analyzes collision data, including records of bicycle-involved collisions, for patterns that can be addressed by engineering, education or enforcement. Collision records are promptly entered in the City's collision database by Public Safety officers, providing a constantly updated picture of bicycle safety issues as reflected by crashes.

In 2002, the City obtained the assistance of MTC's Safety Technical Assistance Program ("SafetyTAP"), which performed a more in-depth analysis of three years of bicycle-involved crash data. These results are described in more detail below; the bicycle-related pages from the SafetyTAP report are reproduced as Appendix D.

MTC SafetyTAP Study

The Metropolitan Transportation Commission's Bicycle/Pedestrian Safety Technical Assistance Program ("SafetyTAP") analyzed Sunnyvale's 133 reported bicycle-involved collisions for the 3-year period from July 1999 through June 2002 based on several factors. The SafetyTAP study also reviewed Sunnyvale's existing programs, policies, practices and resources.

The following tables summarize the study's key findings. Notes and recommendations appear after each table. Table 2.13 identifies the main collision factors involved in bicycle incidents. Right-of-way violations, mostly by motorists, are a leading factor. For bicyclists, wrong-way riding is a significant issue.

Table 2.13: Bicycle-Involved Collisions by Primary Collision Factor, July 1999 – June 2002
LT = Left Turn, RT = Right Turn, FTY = Failure To Yield, RLR = Red-Light Running, WW = Wrong Way

Primary Collision Factor (PCF)	Count (%)		Motorist-at-fault and factors	Bicyclist-at-fault and factors
Right Of Way	40	(30%)	32 (80%)	8 (20%)
Improper Turn	25	(19%)	21 (85%), mostly RT cutoff	4 (15%)
Bicycle Wrong Way	23	(17%)	0 (0%)	23 (100%)
Failure To Yield at Signals and Signs	9	(7%)	0 0%	9 (100%) exiting driveway or alley onto minor road
Subtotal	**97**	**(73%)**	**53** (55%)	**44** (45%)
Other	36	(27%)		
TOTAL	**133**	**(100%)**		

Of the collisions where Right Of Way violation was the PCF, the motorist was at fault in 32 of 40 cases (80%). In addition, 83% of those motorists were male – mostly between 30 and 45 years old. The motorist-caused collisions of this type tended to involve either:

- Oncoming left turns (mostly daytime with clear weather, all on major roads, half at signals and half with no controls), or
- Failure to yield when exiting a driveway or alley (mostly onto minor streets)

Bicyclists were at fault in the remaining eight collisions where Right Of Way violation was the PCF. All of the bicyclists in these incidents were male, and all but one was under 16

years old. All eight collisions involved failure to yield when exiting a driveway or alley onto a minor street. Interestingly, all eight motorists were female.
In 21 of the 25 collisions where the PCF was Improper Turn, the motorist was at fault and typically executed a "right-turn cutoff" (overtaking and then turning right in front of a bicyclist).

In all collisions where the PCF was Failure To Yield, bicyclists were at fault and were exiting driveways or alleys onto minor streets.

As these results illustrate, bicyclist failure-to-yield when exiting driveways and alleys, also known as "darting out", is a significant collision factor in Sunnyvale (19 of 44 collisions where the bicyclist was at fault, second only to the 23 wrong-way incidents). Darting out is mostly a youth behavior that can be addressed through education in schools, a "driveway ride-out" teaching station in a bicycle rodeo, and "bicycle diversion" classes. Sunnyvale's bicycling education programs offer all three channels.

Table 2.14 examines the crash types associated with various forms of intersection control.

Table 2.14: Bicycle-Involved Collisions by Intersection Factor, July 1999 – June 2002
LT = Left Turn, RT = Right Turn, RLR = Red-Light Running, WW = Wrong Way

Location	Count (%)		Type	Motorist fault and factors	Bicyclist fault and factors
Intersection	77	58%	64% Controlled	65% (LT, RT)	35% (Mostly RLR, WW)
			36% Uncontrolled	50% (LT)	50% (WW, Improper Turn)
Non-intersection	56	42%		Improper RT, Entering traffic from driveway or alley	1) WW (mostly male adults), 2) Dart-out (mostly minors, all male)
TOTAL	**133**	**100%**			

Because bicyclists ride wrong-way for several different reasons, it may be useful for staff's periodic collision analysis to identify age, behaviors, and other factors involved in wrong-way incidents.

Many inexperienced bicyclists believe that it is safer to face oncoming traffic, perhaps based on the valid pedestrian safety guidance to walk facing traffic on roads without sidewalks. Riding against traffic on the roadway is the local practice in some parts of the world. Bicyclists who ride on the sidewalk may not realize that motorists do not expect them to enter the intersection from the "counter-flow" direction.

Some bicyclists mostly ride in the same direction as other traffic, but ride wrong-way to avoid crossing an arterial roadway twice when their origin and destination are on the same side. Some also turn left improperly by briefly crossing to the left-hand curb shortly before the intersection. In cities with one-way streets, wrong-way riding reduces distance compared to going around the block.

Table 2.15 breaks out crashes by injury severity, and notes the patterns associated with severe or moderate injuries. When analyzing motor vehicle-only collisions a non-injury / injury ratio of 2:1 or higher is expected, assuming that Property Damage Only collision reports are taken by the local law enforcement agency. In contrast, it is common for

non-injury bicycle-involved collisions to be unreported, and many uninjured or barely-injured bicyclists will not stop to exchange contact information.

Table 2.15: Bicycle-Involved Collisions by Injury Severity, July 1999 – June 2002

Injury Severity	Count	%	Notes
Fatal	2	2%	
Serious	7	5%	Mostly motorist fault, improper turn
Other Visible Injury	60	45%	Bicyclist victims: males < 18, males 19-25
Complaint of Pain	54	41%	
Property Damage Only	10	8%	
TOTAL	**133**	**100%**	

Possible reasons for "motorist at fault, improper turn" bicycle-involved collisions may include poor bicyclist visibility (dark clothing, no lights) or through movements made too close to the right hand curb – or even in the adjacent marked crosswalk. Review of individual collision reports to determine probable bicyclist line of travel can determine whether the latter behavior is a significant contributing factor in these types of crashes, and Sunnyvale staff performs such analysis.

Table 2.16 examines patterns associated with lighting conditions.

Table 2.16: Bicycle-Involved Collisions by Lighting Conditions, July 1999 – June 2002

Lighting condition	Count	%	Notes
Daylight	108	81%	
Dark – street lights	16	12%	Motorists and bicyclists equally at fault.
Dusk or Dawn	8	6%	72% at intersections; 50% uncontrolled
Dark – No street lights	1	1%	Cyclist ages: about 50% are 17-25, regardless of fault 50% involve Serious or Other Visible injury severity.
TOTAL	**133**	**100%**	

Poor bicyclist visibility is often a factor in after-dark collisions. If an analysis of the 17 crashes that occurred under dark conditions revealed many unlighted bicyclists, promotion of headlight and taillight use could be considered. However, because at least 50% of cyclists involved in non-daylight crashes were 17 or older, schools cannot be the only means of delivering the message. Retail workers using bicycles to commute might be reachable through flyers and promotional coupons, possibly in Spanish-language publications or through workplaces.

Table 2.17 examines the top five locations for bicycle-involved collisions.

Table 2.17: Bicycle-Involved Collisions – Top Locations, July 1999 – June 2002

#	Primary Street	Secondary Street	Count	Notes
1	El Camino Real	Mary Avenue	5	Mary = Key N-S corridor
2	El Camino Real	Between Cezanne Dr and Fair Oaks Ave	3	Retail on both sides of El Camino
3	El Camino Real	Mathilda Ave	2	Mathilda = Key N-S corridor, near downtown
4	Mathilda Ave	Olive Ave	2	Olive = Key E-W corridor to downtown
5	Mary Ave	Olive Ave	2	Olive = Key E-W corridor near downtown
		TOTAL	**12**	**(9% of 133 total)**

Although 12 crashes is not a large fraction of the total, it is interesting that so many of the top five locations are either on El Camino Real or within one signal of it. This may

simply reflect higher bicycle activity near commercial land uses, or possibly bike-on-transit use on El Camino's busy 22 and 522 bus lines.

Work Zone Procedure

In addition to retrospective analysis, Sunnyvale applies proactive safety practices to reduce the likelihood of crashes. For example, the City's Standard Operating Procedure titled "Bicycle and Pedestrian Safety Through Work Zones" sets standards and guidelines for the following items:

- Warning signs types and locations
- Bike lane closures
- Sidewalk closures
- Work zones where no travel lanes are closed
- Nighttime visibility
- On-street storage of equipment
- Complaint procedures

This Standard Operating Procedure appears as Appendix C.

Bicycle Hazard Reporting Contact

The City's website includes a Bicycle and Pedestrian Improvement Request form for reporting hazards or requesting enhancements to bicycle facilities. The webpage containing the form also lists phone and email contacts for reporting hazards on Sunnyvale streets, Santa Clara County expressways, and Caltrans facilities such as El Camino Real.

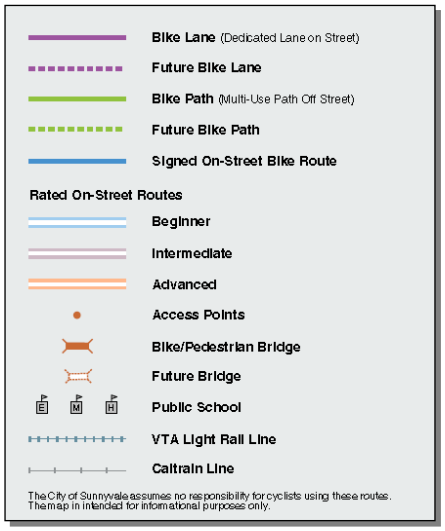
2.7 Education and Encouragement

Bicycling improves personal health and fitness, and each trip made by bicycle rather than by motor vehicle improves the environment. For children, bicycling builds an active lifestyle and offers age-appropriate independence and personal mobility. For older adults, cycling provides everyday fitness and recreation to counter the aging process.

Improving Sunnyvale's streets provides the environment needed for pleasant and convenient cycling. Education and encouragement help the City's residents and workers of all ages to discover the route options and destinations reachable by bike. Street cycling classes for children and adults create safer and more confident bicycle drivers.

Sunnyvale Bicycle Map

A bicycle map is a key part of an education program because it shows routes that cyclists might not otherwise discover, and lets cyclists select routes that meet their needs for directness and comfort. Figures 2.19 and 2.20 show the front and back of the City's 2005 Bicycle Map.



"Recommended competence" ratings

The Bicycle Map uses line color and style to indicate facility type, existing vs. planned, and recommended skill levels (see legend at right). Solid-color lines indicate existing bike lanes (Caltrans Class II), signed routes (Caltrans Class III), and paths (Caltrans Class I paved facilities, bike bridges, several unpaved paths in the Baylands, plus one-block "shortcuts" that are also useful for walkers. "Access points" (tan dots) show where users can enter a path.

All major Sunnyvale street segments with neither bike lanes nor bike route signs are shown in white with a color border denoting suggested skill level for riding during peak traffic periods, as explained on the back of the map:

Beginner – Indicates a street with low traffic volumes and speeds. These streets are suited for use by individuals with limited competency in cycling ability and some knowledge of safety rules and the rights and responsibilities of cyclists and motorists.

Intermediate – Indicates a street with moderate speeds and traffic volume. Bicyclists must share the road with vehicles; however, there is typically enough room for this to be accommodated comfortably. It is suited for individuals knowledgeable of the safety rules and responsibilities of the road and who have a basic level of cycling competency.

Advanced – Indicates a street with high speeds and traffic volume. Bicyclists must share the road with vehicles. On these routes, this is typically not accommodated comfortably based on the width of the outside lane and presence of parked vehicles. These routes are suited for individuals who are capable of riding on major roadways, and in high traffic volume with very little difficulty, and are informed and knowledgeable of all safety rules and responsibilities of the road.

Although the solid-color lines do not indicate recommended skill level, bike lanes are "beginner" to "intermediate" by convention.

"Advanced" ratings for Central and Lawrence Expressways reflect high vehicle speeds. The "Advanced" rating for El Camino Real reflects moderately high vehicle speeds combined with conflicts at driveways and intersections.

The Bike Map also shows schools, parks, community center, civic and downtown areas, rail lines, stations, transit centers, and fire stations. Bike lanes and paths in adjacent cities are shown as well.

Future facilities shown are funded and to be constructed in the near future. These include bike lanes on the full length of Evelyn Avenue and on Mary Avenue between Fremont Avenue and Homestead Road, the bike/pedestrian bridges on Borregas Avenue at US-101 and Highway 237, and the bike/pedestrian bridge across I-280 at Mary Avenue including a connector path to Homestead Road.

The back of the map presents illustrated information about safe and legal bicycling, including local and regional bicycle resources. It covers bikeway facility types and route selection, the Sunnyvale Bicycle & Pedestrian Advisory Committee, and local, regional and national bicycle organizations. It also provides education regarding combining bicycles with transit, including bike locker rental contacts, and bicycle registration.

City bicycling webpage

The City has an informational webpage of bicycling resources: biking.inSunnyvale.com. In addition to staff contact information, this webpage has links to:

- The Sunnyvale Bicycle Map, including the safety and commuting tips found on the back side
- Bicycling Street Smarts, a 40-page illustrated bicycle driver education booklet by John Allen, available online and in print
- A Bicycle and Pedestrian Improvement Request form, which also provides information for County Roads facilities (Central and Lawrence Expressways) and State facilities (El Camino Real, and freeway interchanges)
- Local, state, and national bicycle resources including clubs, advocacy groups, bicycle advisory committees, online bicycle commute trip planners, and transit options
- Agendas and minutes of the Sunnyvale Bicycle and Pedestrian Advisory Committee (BPAC)

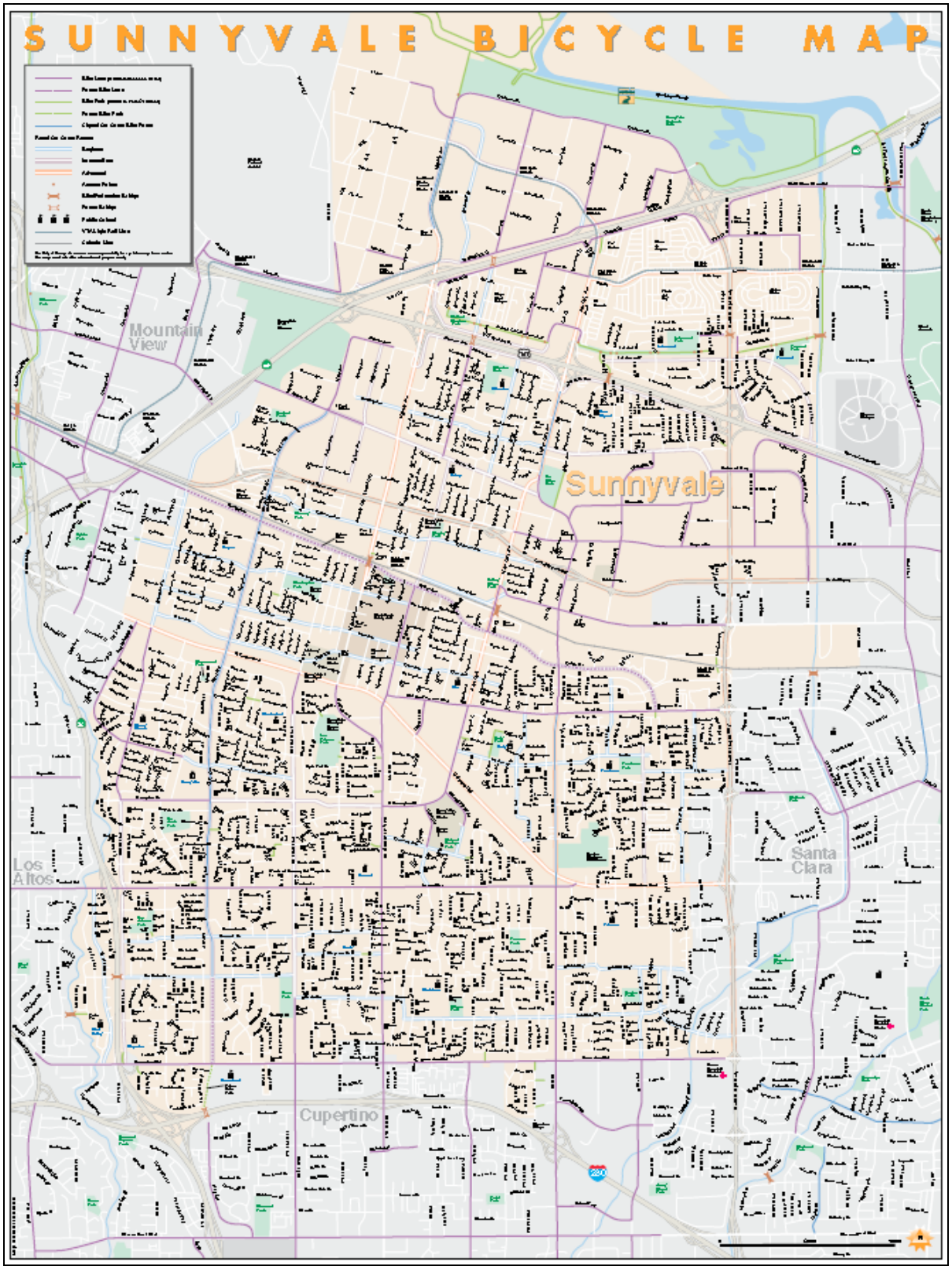


Figure 2.16: Sunnyvale 2005 Bicycle Map (front)

Figure 2.17: Sunnyvale 2005 Bicycle Map (back)

Youth Education

Elementary School "Safe Routes To School" presentations

Sunnyvale's Department of Public Safety has four Neighborhood Resource Officers (NROs) who offer an annual presentation for elementary school students on safe walking and bicycling. Schools request this presentation from Public Safety. A letter to parents at the start of the school year reviews traffic safety issues around their child's school. Neighborhood Resource Officers also offer one-on-one education in the field.

Middle school program: "Drive Your Bike"

In a two-year pilot program, physical Education (PE) classes in Sunnyvale middle schools attend a three-session education program called "Drive Your Bike", created by the Traffic Safe Communities Network in Santa Clara County (TSCN), a joint initiative of the National Highway Traffic Safety Administration (NHTSA), California Office of Traffic Safety (OTS), and Santa Clara County's Public Health Department. This was delivered at Sunnyvale Middle School in 2005 and at Columbia Middle School in 2006.

Each session lasts 40 to 45 minutes. The first two are lecture-style; they begin with the importance of helmets and how to fit one, then explain safe bicycle movements in traffic and the parallels with safe driving of a car. The hands-on third session, called the "On The Bike Challenge", covers helmet fitting (helmets are provided free if parents cannot afford them), bike maintenance checks, and bicycle handling skills training (obstacle avoidance, quick stops, "slow race"). No on-street training is conducted.

In-the-Field Education by Neighborhood Resource Officers

Neighborhood Resource Officers with Sunnyvale's Department of Public Safety conduct as needed on-the-spot education of young cyclists in the field.

Youth "Bicycle Diversion" classes

Officers with Sunnyvale's Department of Public Safety cite bicyclists under age 18 for not wearing helmets and for traffic violations. Violators can have their ticket voided by attending a 2-hour "bicycle diversion" class along with their parents. This lecture-and-discussion class (no on-bike content) is held on a Saturday every month or two depending on demand (more frequently during summer months). As part of the class, a survivor of a bicycle crash discusses the need for helmet use and safe bicycle driving. Approximately 300 children per year (average 25 per month) attend this class.

Annual bicycle safety rodeo at Health & Safety Fair

Each year in early May, the City holds a Health and Safety Fair that is well attended (approximately 1,500 in 2005). A bicycle safety rodeo is held at this event, including:

- Helmet fitting
- Free helmets for children whose families cannot afford helmets
- Free bicycle inspection and adjustment by a local bicycle shop
- An off-street, on-bicycle skills course by State Farm Insurance, including mounting, dismounting, and riding circles, figure-8s, and slaloms
- A miniature "Safe City" intersection with pedestrian and bicycling safety instruction
- A performance and talk by the "Perfection on Wheels" bicycle stunt team, with inspections of bicycles and safety equipment (pads, helmets) for children interested in "BMX" skills such as riding on half-pipes